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The Outlook

R.A.F. Technical Branch

THE decision of the Air Council to form a Technical Branch of the Royal Air Force settles a point which has been much discussed since the Armistice. When the Air Force came into being in 1918 it included two non-flying classes of officers, Administrative and Technical. These, however, did not survive for very long, and for some years the tendency was to make officers of the General Duties Branch undertake all the work of the Service except the charge of stores and accounts. Specialist courses prepared certain officers to take charge of repairs to engines and airframes, while others were appointed as adjutants and took charge of administration without any special training.

This organisation was wasteful by taking pilots away from their proper duty of flying, and of recent years the tendency has been in the other direction. Civilians (mostly retired officers) have been employed as station adjutants, though the adjutancy of squadrons has been left in the hands of general duties officers of the squadrons. Technical duties have been increasingly entrusted to commissioned warrant officers. Both these innovations have set free a number of pilots for regular flying duties. Piloting is itself a very specialist occupation, and it is not economical to take specialists away from their proper sphere and make them specialise in ground duties. In fact, with the expansion of the Service and the need to have as many pilots as possible in the air, the position was growing impossible.

Relieving the Pilot

ONE has only to glance at the dashboard of a modern aeroplane to see that the work of a pilot is now much more complicated than it was twenty years ago. It is no simple matter to remember the routine which must be followed before a multi-engined machine can be taken off, and likewise when it is to be landed. Constant practice is necessary if the pilot is to be relied on to follow these routines automatically while at the same time exercising his skill in all those ways where the human factor is still pre-eminent.

The great majority of the pilots are short-service officers who spend only four or six years in the squadrons. To take them off flying while they specialise on repair and maintenance work is now obviously a waste. The case is clear for handing over such duties to another body of men.

The only doubtful point is whether the need could not have been met by increasing the number of commissioned warrant officers. No doubt the Air Council fully considered that point before deciding that a new category of officers was necessary. The commissioned warrant officers are men of long service and experience, and their numbers cannot be multiplied by a stroke of the pen. It was clearly necessary to recruit men from civil life, and probably it was felt that only by the offer of a commission could a good response be secured.

We have not yet been told if the new technical officers are to receive permanent commissions or short-service commissions, and until that point is known it is impossible to guess whether this new branch is likely to prove attractive to engineers who are already highly qualified.

Air Racing—New Style

FROM the particulars concerning the regulations for the air races for the King's Cup and Lord Wakefield's Challenge Trophy published in this issue (p. 132) it is evident that the Racing Committee of the Royal Aero Club has had in mind a "better and brighter" race. *Flight* has criticised in previous years the system of handicapping before the race, which made close finishes almost impossible. This year there should be some extremely close finishes, as machines will be rehandicapped on performance after each of the sections flown.

Add to this promise of close finishes the fact that the course is to be a short one of only 20 miles, and it will be appreciated that there should be no lack of interest at Birmingham Airport on September 2. The number of entries (12 and 14 respectively) is such that the risk of collisions cannot be altogether ruled out, especially as there will be several "finishes" instead of the more usual single final.

The system of points to be awarded to the first five competitors in each section, and the penalty of one point for each m.p.h. by which a competitor exceeds by more than 5 m.p.h. his best speed in any preceding section, will call for careful throttle work. Theoretically a competitor can increase by exactly 5 m.p.h. his speed in the previous section, but if he miscalculates and exceeds by 6 m.p.h. he will lose a point. On the other hand, he will want to be as near the 5 m.p.h. as possible in order to have any chance of obtaining a useful number of points by being among the first five in each section. Out-and-out piloting skill will have to be allied to a flair for mental arithmetic.

Although spectators at Birmingham Airport will have plenty to watch, with so many turns having to be made over the aerodrome, it will probably not be too easy to follow the details of the race because the first five to finish in each section will not necessarily be placed in that order; one or more of them may have lost points by increasing their speed just a little too much.

The Heliocopter Canard

LAST week an evening newspaper started something of a flutter by announcing that the British Air Ministry had ordered a helicopter from the Hungarian designer Oskar von Asboth. The truth of the matter is that the Air Ministry has placed no such order and is not likely to do so unless and until arrangements have been made for Asboth Helicopters, Ltd., to manufacture it in this country. It would have been not a little absurd if the Air Ministry had ordered such a machine from the Société des Helicoptères Asboth, of Paris, a firm which acquired the French rights from the British company last year.

It is known, however, that the French firm has built a machine, the A.H.4a, with 180 h.p. le Rhone engine, and that other designs in hand include one, type A.H.6, of the same horse-power, but with rotor blades of 36ft. diameter instead of the 16ft. of the A.H.4a. Designs are now being prepared for a machine of 500 h.p., for which lifting screws of more than 39ft. diameter are contemplated. All the Asboth designs have two co-axial rotors, one above the other.

Lest it be thought that this country is lagging behind in helicopter development, it may be well to point out that a British-designed and built two-rotor helicopter has made a great number of flights, and designs for a single-rotor type are well advanced, and construction is likely to be begun very soon.

As to which particular type is likely to survive, it is difficult to express any very definite opinion. Each has its advantages and disadvantages. The co-axial two-rotor type suffers from the risk that the blades of upper and lower rotor may, in their exuberance, flap to such an extent that they hit and damage one another. The side-by-side arrangement is likely to suffer from excessive drag of supporting structure. The single-rotor type is obviously the most attractive, but there is an off-set torque reaction which has to be taken care of somehow.

"Flight" photograph.

SEASONAL SCENE: The Jersey and Guernsey Airways' D.H. Flamingo flying over Portelet Bay on the south coast of Jersey. This 95 is actually the prototype, which is in semi-experimental use by the two companies pending the arrival of further examples for the 1940 season.

A Formidable Ship-plane

The Blackburn Skua I Fighter Dive-bomber : "Diving-brake," Flaps and Built-in Flotation : Bristol Perseus Sleeve-valve Engine

THE naval air arms of the world are attaching great importance to the diving method of bombing attack. Great Britain is well to the fore in this respect and large numbers of Blackburn Skua I deck-landing monoplanes, which specialise in dive-bombing and fighting, are being delivered to units of the Fleet Air Arm, now under Naval control.

Thanks to unique flaps which, apart from facilitating take-off and landing, can be used in the dive to limit the speed to 220 knots, the Skua is able to approach close to its target in an almost vertical dive and release its bomb load with exceptional accuracy.

As a long-range two-seater fighter the Skua has four fixed machine guns and a fifth weapon in the rear cockpit. The machine can also be employed to tow drogue targets for gunnery practice.

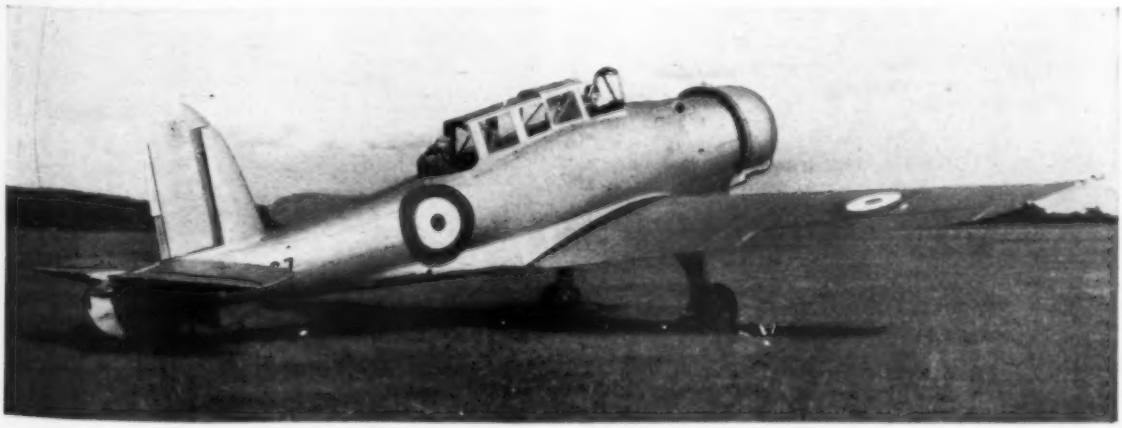
Other points of special interest are the effective wing-folding arrangements and the water-tight compartments in the fuselage (features which characterised the Blackburn Shark T.S.R. machine) and the unusual tail unit with the fin and rudder placed forward of the horizontal surfaces.

A development of the Skua, designated the Roc, is fitted with a power-driven multi-gun Boulton Paul turret. This specialised two-seater fighter is also in production for the Fleet Air Arm.

Fundamentally the Skua is a single-engined low-wing cantilever monoplane of metal construction powered with a Bristol Perseus XII radial engine. The wing is built in three portions—the centre section and the two outer panels. The centre section, the upper surface of which forms the bottom of the front water-tight compartment, is bolted under the fuselage and is detachable.

Official restrictions prohibit publication of wing-folding details and it is not possible to describe the methods adopted for stowing the Skua in the hangar of an aircraft carrier. The success of the Blackburn Shark in this respect augurs well for the Skua.

Structurally, the centre section comprises two box spars composed of Alclad plate webs reinforced by vertical stiffeners and flanges of extruded section, flanged plate ribs, Z-section stringers and plating attached by flush and hollow rivets. Tapering in plan and thickness, the outer wing panels have detachable upswept tips. Structurally they are similar to the centre-section except that the main spars are of box section for part only of their length, changing to single webs towards the tips. Between the main spars, forward of the ailerons, are watertight compartments to provide flotation, and near the roots are circular recesses for the wheels of the undercarriage together with appropriate troughs for the struts.



This ¾-rear view of the Skua I shows to advantage the unorthodox tail unit and the gunner's position with its folding hood.

Another view of the Skua I as now in production. It will be gathered that the pilot has a good view for dive-bombing.

Between the ailerons and the wing roots, forward of the trailing edge, are troughs which house the special flaps. These have a combined area of 18.5 sq. ft. and are normally stowed flush with the lower surface of the wing. They are entirely of metal construction, even to the covering.

The ailerons have inset hinges and are mounted on ball bearings. Each is built round a single girder-type spar reinforced by a metal leading edge and having ribs pressed from Alclad sheet. They are covered with fabric.

Of metal monocoque construction, the fuselage is built in two sections with a joint just forward of the fin. Essentially the structure comprises Alclad frames, stringers and special sections riveted together, and flush-riveted plating. There are two water-tight compartments in the main fuselage, one forward under the floor of the pilot's cockpit and the other aft of the gunner's position. The cockpit itself is water-tight up to the coaming. The bomb compartment is built integral with the fuselage.

Of similar construction, the rear fuselage is bolted to the main structure. This carries the tail and tail wheel, the latter having light metal fairings.

The explanation of the unusual tail layout is that for stowage in the hangars of aircraft carriers dimensions must be kept down to a minimum and the Blackburn designers accordingly decided to keep the vertical surfaces forward. The tail plane is bolted to two frames of the rear fuselage structure and is non-adjustable, though the elevators have trimming tabs with irreversible controls operated from the cockpit. It has two girder-type spars with formers and transverse stringers of Z-section, the metal plating being attached by hollow rivets. A cross-shaft connects the elevators, which have single girder spars, with Alclad formers and leading edges, the main covering being of fabric. All hinges have ball bearings. The fin is detachable from the fuselage and is a metal-covered structure having an Alclad stern post, a stern post bracing strut and flanged formers. The rudder is similar in construction to the elevators and has a horn balance, inset hinges and automatic balance flap and hand-operated trimming tab inset into the trailing edge.

Each unit of the retractable undercarriage folds outward and upward into wells in the outer wing. The wheels have intermediate-pressure Dunlop tyres and are attached to Vickers oleo-pneumatic compression struts. Each unit comprises one of these struts with a stub axle and wheel, a rear stay tube and a telescopic side-stay strut. The shock-absorber unit and the rear stay tube are arranged to hinge about the same fore and aft axis, while the telescopic strut is hinged between, and inboard of, these members. A light metal fairing is attached to each strut and fairs the under-surface of the wing when the undercarriage is retracted. Bolted to the top of the shock absorber strut is a lever which extends above the hinge centre. This is coupled to a hydraulic jack which raises and lowers the undercarriage. Locking devices, also operated by hydraulic jacks, are fitted in the telescopic side-stay struts and in the wheel wells, their purpose being to secure the undercarriage in raised and lowered positions. Each of these locks operates an electrical indicator which shows by means of coloured lights in the pilot's cockpit the position of the lock. In the wing is a mechanical indicator which also notifies the pilot of the position of his wheels. An audible warning device is also incorporated.

The Palmer tail wheel unit comprises a coiled spring shock-absorbing strut with castored fork axle and wheel and electrically conductive tyre. In flight the wheel is maintained in a fore-and-aft position by a self-centring device in the strut.

The single Bristol Perseus XII nine-cylinder radial

sleeve-valve engine drives a two-position De Havilland variable-pitch airscrew 11ft. 6in. in diameter. The Perseus XII is a medium-supercharged unit rated at 745 h.p. at 2,400 r.p.m. at 6,500ft. For all-out level flight at the same height 905 h.p. is available, and the take-off output is 830 h.p. The engine is provided with a standard Bristol long-chord cowling with single-outlet leading-edge exhaust collector and adjustable gilled outlet. Its mounting is a tubular two-bay structure.

Fuel is carried in two main tanks installed in the sides of the fuselage aft of the pilot's seat, and in a third tank mounted in the front water-tight compartment. Supply is by an engine-driven pump through selector cocks which enable the feed to be taken from any tank or combination of tanks. An electrical contents gauge is fitted to each tank and there are special traps to retain the fuel at the supply pipe during dive bombing.

"Flight" photograph.

The action of the Skua's "diving brake" flaps is illustrated on the right. Below is an eloquent line-up of Skuas outside the Blackburn works at Brough.

The oil system is engine-operated by pressure and scavenge pumps and embodies the usual filters. In the pressure pump is an automatic device giving a high initial oil pressure, allowing cold oil, by-passed by the relief valve, to build up a pressure adequate for the lubrication of all bearings when the engine is started from cold. The oil tank holds 12 gallons and is situated in the fuselage in front of the pilot's instrument board. The oil cooler is mounted internally on the engine mounting and is fed by two forward-facing ducts. At the rear of the cowling is a manifold which has three ducts, the outer two being led to the atmosphere and the centre one, which incorporates a shutter, being taken to the pilot's cockpit. When cockpit heating is not required the shutter deflects the warm air into the outer ducts.

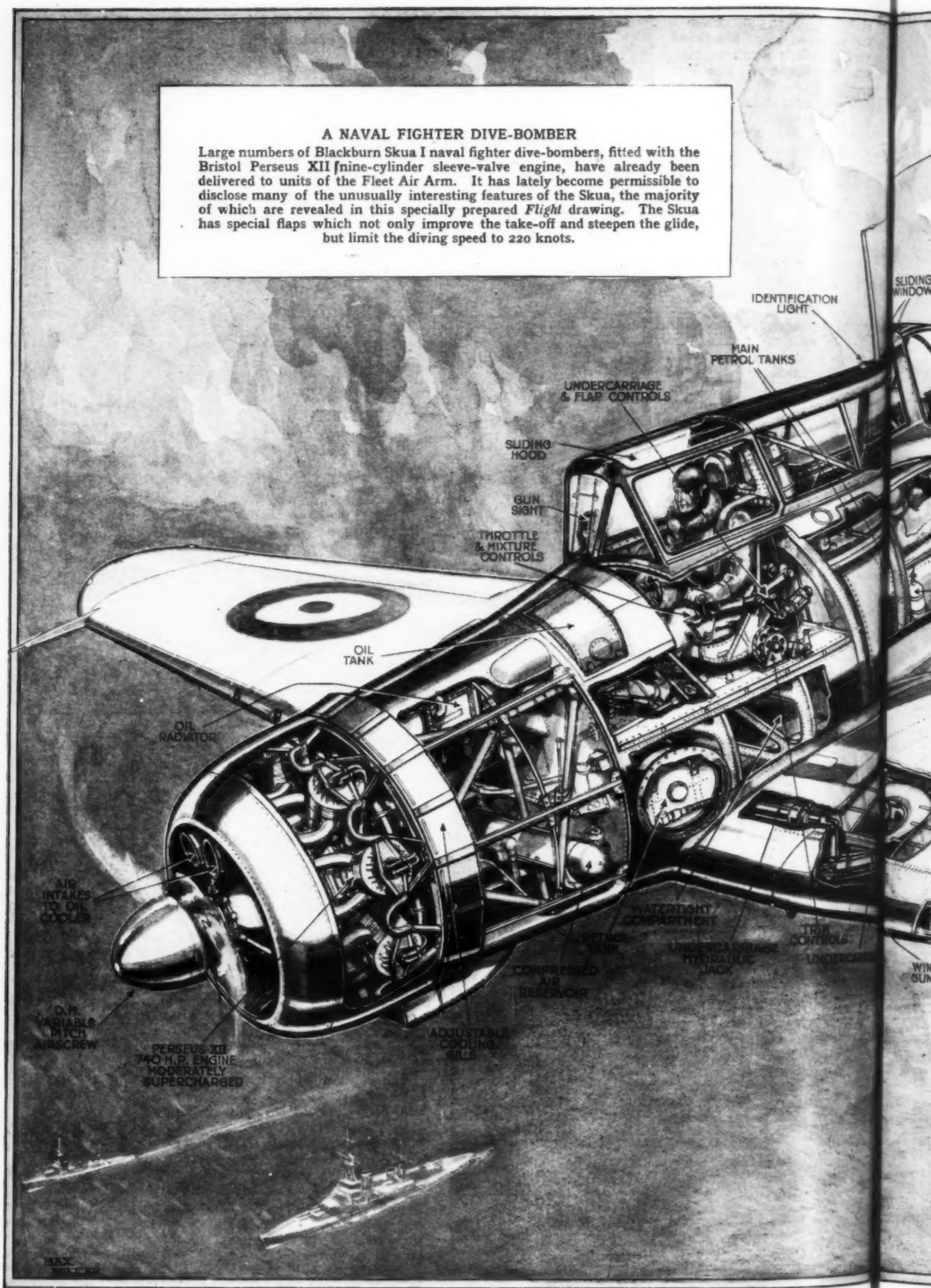
Engine starting is effected by an electrically fired cartridge starter, the pistol unit of which is mounted on the port side of the cockpit and connected by a pipe line to the turbine unit on the rear of the engine. First, the engine is primed, then a cartridge is inserted into the pistol and the starter button pressed.

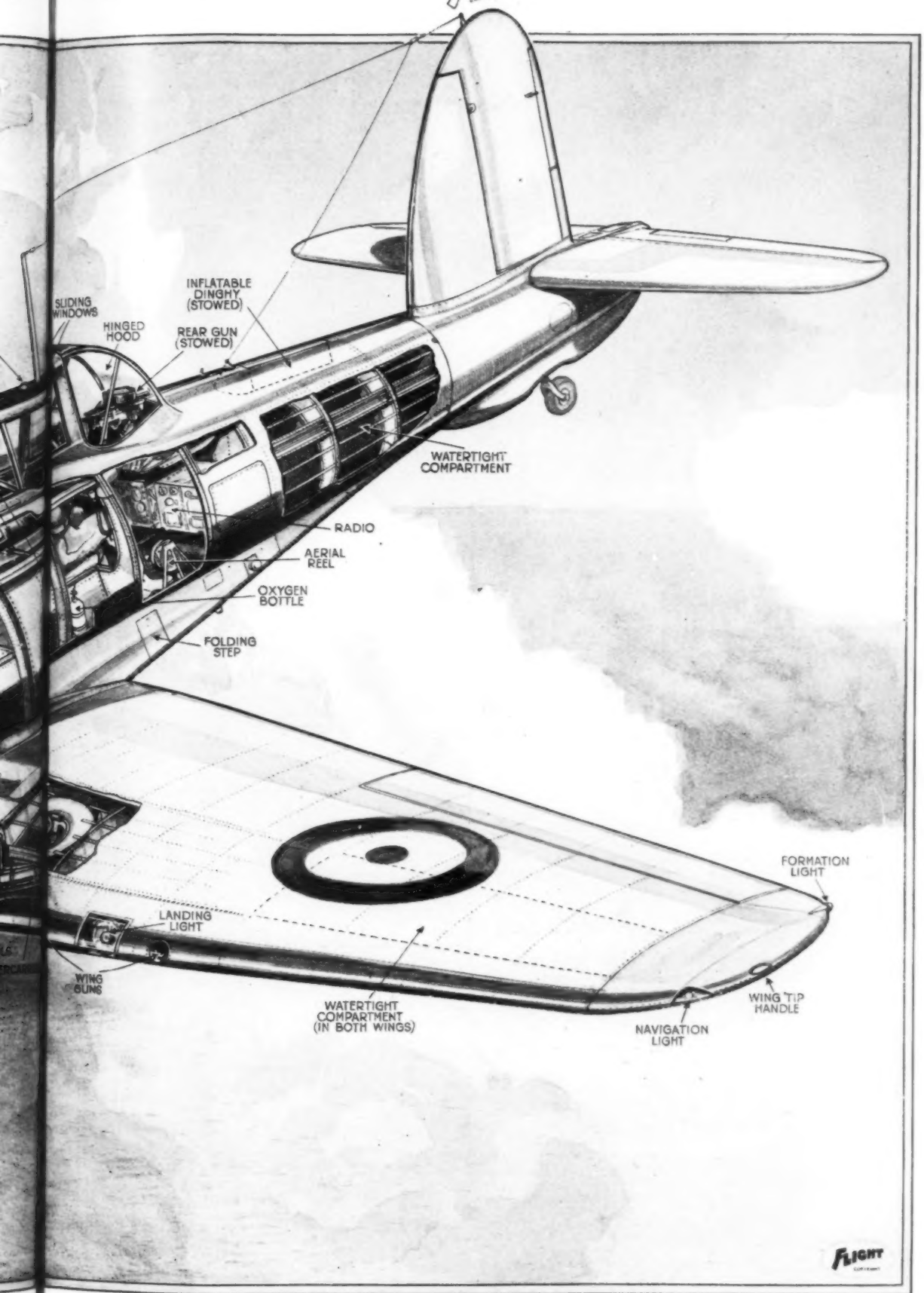
The retractable undercarriage and the wing flaps are operated hydraulically but the wheel brakes and the control of the four fixed guns is pneumatic.

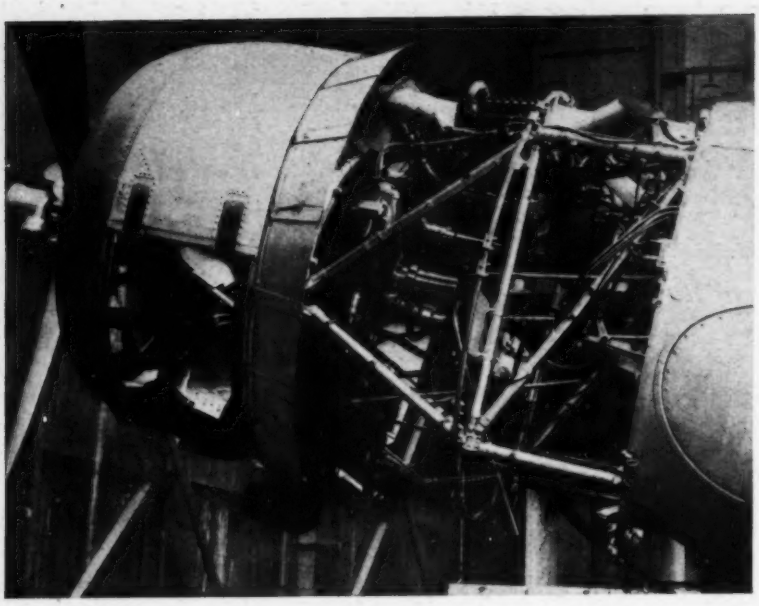
In the hydraulic system are an engine-driven pump, fluid reservoir, main and emergency selector valves, restrictor valve and the hydraulic jacks. The selector valve has separate control valves and levers for operating the undercarriage and flaps. When the levers are neutral fluid is circulated by the engine pump from the reservoir and goes through a by-pass back to the reservoir without pressure. When the undercarriage selector valve lever is moved in to the "up" or "down" position the by-pass is closed, the fluid is passed into the pipe lines, pressure is built up and the jack connected to the undercarriage

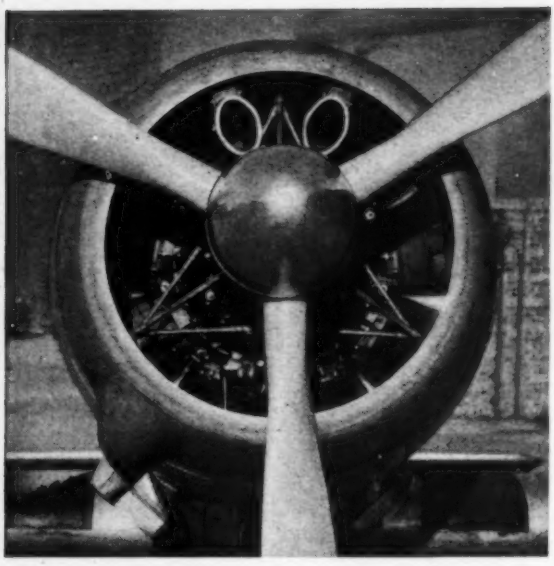
A NAVAL FIGHTER DIVE-BOMBER

Large numbers of Blackburn Skua I naval fighter dive-bombers, fitted with the Bristol Perseus XII nine-cylinder sleeve-valve engine, have already been delivered to units of the Fleet Air Arm. It has lately become permissible to disclose many of the unusually interesting features of the Skua, the majority of which are revealed in this specially prepared *Flight* drawing. The Skua has special flaps which not only improve the take-off and steepen the glide, but limit the diving speed to 220 knots.




SLIDING WINDOWS
HINGED HOOD
INFLATABLE DINGHY (STOWED)
REAR GUN (STOWED)
WATERTIGHT COMPARTMENT
RADIO
AERIAL REEL
OXYGEN BOTTLE
FOLDING STEP
FORMATION LIGHT
LANDING LIGHT
WING GUNS
WATERTIGHT COMPARTMENT (IN BOTH WINGS)
NAVIGATION LIGHT
WING TIP HANDLE
FLIGHT





Two views of the installation in the Skua I of the Bristol Perseus XII nine-cylinder sleeve-valve radial. The two pipes seen above the spinner in the front view feed air to the oil cooler.

strut is set in operation. Simultaneously the restrictor valves ensure that the locking devices operate before and after the movement.

To guard against failure of the engine-driven pump and to provide for occasions when the engine is not running, a hand pump is fitted. This is driven through a normal system and an emergency system, the former operating through the main selector-valve box in the same way as the engine-driven pump system. The emergency system can be used only to lower the undercarriage.

To operate the flaps, hydraulic jacks are mounted between the inner flap runners in the wings. These jacks are connected by pipe lines to the main selector-valve box, which has a separate control valve and lever. A flow control valve is introduced into the system to form a hydraulic lock for any position of the flaps. Thus, the flaps may be set at any angle and the main system is relieved of the high pressure set up by the flaps when the machine is diving at high speed. As in the case of the undercarriage, either the engine-driven pump or hand-pump system may be used.

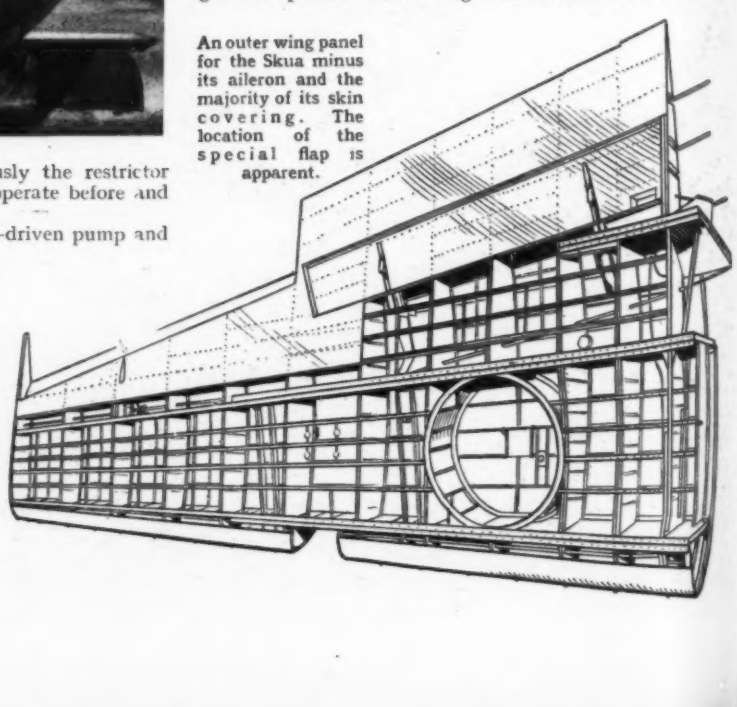
The pneumatic system comprises an engine-driven compressor air reservoir, oil reservoir and trap, air filter, pressure gauge and charging union. The wheel-brake system (an important item in the machines used from aircraft carriers) is worked by a hand lever on the control column, the braking pressure varying according to the movement applied. The lever can be locked for parking. It is arranged that movement of the rudder bar has a differential effect.

The equipment and accommodation of the Skua is as interesting as the structure. The four fixed machine guns are mounted in the leading edge of the wings, each pair firing outside the airscrew arc. The rear gun is on a special manually operated mounting.

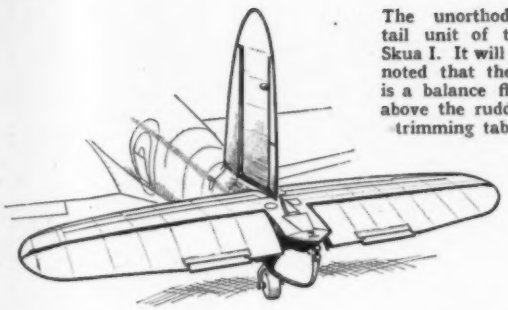
Wireless transmitting and receiving apparatus is fitted in the rear cockpit. There are fixed and trailing aerials and the electrical services include navigation and identification lights, and a landing light in the port wing.

Being a naval machine the Skua carries an inflatable dinghy (stowed in the rear section of the fuselage), marine distress signals, slinging gear and an arrester hook for deck landing.

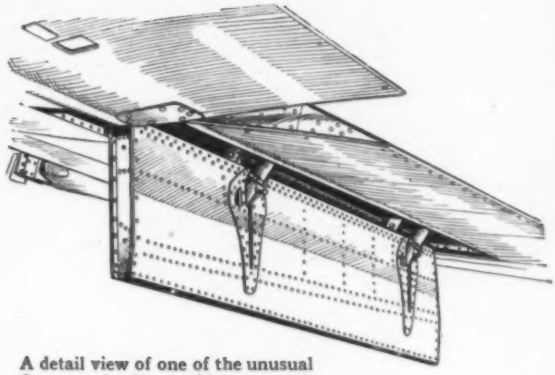
The seats for the pilot and air gunner correspond approximately with the leading and trailing edges of the wing. The two positions are connected by a long transparent enclosure on top of the fuselage. Access to the pilot's seat is gained by means of a sliding hood, which may be locked in open, closed or intermediate positions. The windscreen has three flat panels and was designed to give good vision in wet weather and to prevent draught in the cockpit when the sliding hood is pushed back. The gunner's position has a hinged hood which folds forward



An outer wing panel for the Skua minus its aileron and the majority of its skin covering. The location of the special flap is apparent.



The unorthodox tail unit of the Skua I. It will be noted that there is a balance flap above the rudder trimming tab.

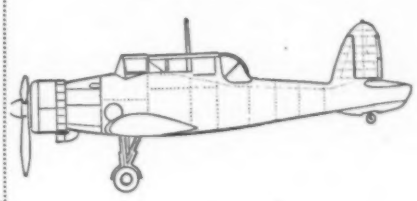


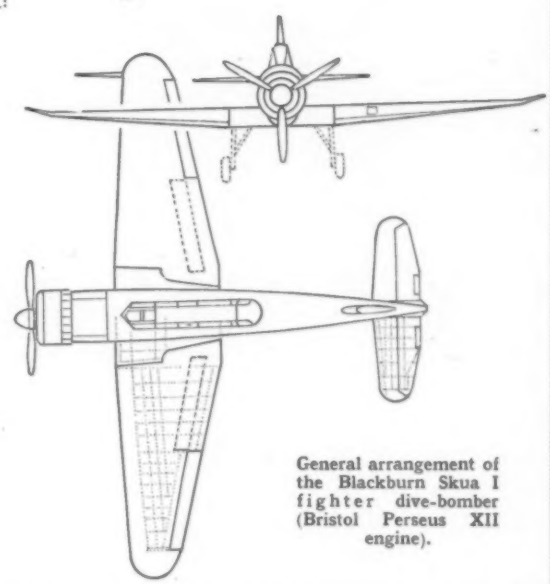
A detail view of one of the unusual flaps on the Skua which not only improve take-off and landing but act as diving brakes.

and the cabin enclosure has sliding side panels which, when open, operate wind deflectors which prevent the slipstream entering the cockpit.

Apart from special strengthening of the pilot's windscreen, two fuselage frames behind the pilot's seat are stiffened up and extend to the cabin roof to give protection for the crew in the event of the machine nosing over on the ground.

A representative of *Flight* who has been dived in a Skua reports that with flaps down at about 220 knots the machine is "steady as a rock." Manœuvrability, too, is outstandingly good, as has been demonstrated in public during the low-flying converging attacks for which the Fleet Air Arm is famed, and to which the Skua, with its heavy armament, is particularly suited.





General arrangement of the Blackburn Skua I fighter dive-bomber (Bristol Perseus XII engine).

BLACKBURN SKUA I

Fighter Dive-bomber

Bristol Perseus XII Engine (745 h.p. at 2,400 r.p.m. at 6,500ft.)

Span	46ft. 2in.
Length	35ft. 7in.
Height (over mast)	14ft. 2in.
Wing area	312 sq. ft.
Track	9ft. 7in.
Airscrew diameter	11ft. 6in.

	Normal Service Equipment	Drogue Target Aircraft
Weight empty	5,490 lb.	5,490 lb.
Military load	1,321 lb.	1,381 lb.
Oil capacity	10 gal.	6 gal.
Oil weight	90 lb.	54 lb.
Top speed at 6,500ft.	225 m.p.h.	224 m.p.h.
Max. cruising speed at 15,000ft.	187 m.p.h.	189 m.p.h.
Economical cruising speed at 15,000ft.	144 m.p.h.	145 m.p.h.
Top speed at sea level	204 m.p.h.	205 m.p.h.
Landing speed	75 m.p.h.	70 m.p.h.
Service ceiling	20,200ft.	22,800 ft.

The Busk Studentship

THE Trustees of the Busk Studentship in Aeronautics, founded in memory of Edward Teshmaker Busk, who lost his life in 1914 while flying an experimental aeroplane, have awarded the Studentship for the year 1939-40 to R. H. Whitby, B.Sc., City and Guilds College, London.

Co-ordination and Litigation

AT the recent Copenhagen International Chamber of Commerce Congress, the delegates were told that combined air-rail tickets would be introduced for the first time in Europe on the occasion of the Cologne International Communications Exhibition next year. Such tickets will be in use on the London-Cologne-Berlin journey.

Incidentally, the I.C.C. had requested Prof. H. Oppikofer, who is a legal authority of international reputation, to prepare a table of the various international conventions and national laws by which North Atlantic air transport would be governed. Needless to say, before the establishment of any inter-continental airline, there are legal problems of considerable importance to be solved, and these are particularly complicated in the case of the Atlantic services. Preparatory to making an attempt to eliminate some of the difficulties, an outline of the regulations and agreements was prepared, and the memorandum concerned was submitted to the Copenhagen Congress. Copies of the memorandum can be obtained from The International Chamber of Commerce, 38, Cours Albert Ier, Paris Ville.

B

L.Z.130 Near Scotland

ON Wednesday of last week a large rigid airship, identified as the *Graf Zeppelin*, was observed in the vicinity of the Scottish coast. At first it was denied that the airship had been out of German territory, but later a communiqué from Frankfurt stated that the airship had been on a two-days' test flight "over North Germany and the North Sea." There is, of course, no reason why a German airship should *not* fly over the North Sea.

THE KING'S CUP RACE

Twelve Machines Entered for this Event, and Fourteen for the Wakefield Challenge Trophy : £1,500 in Prizes

THE ROYAL AERO CLUB has now issued the list of entries for the King's Cup Race and for the Wakefield Challenge Trophy, both of which are to be held at Birmingham Airport on Saturday, September 2. In addition to the King's Cup and the Wakefield Challenge Trophy, Viscount Wakefield is presenting prizes to a total of £1,500.

It may be recalled that this year's race is based on a different set of regulations. Instead of the original handicap covering the entire race, there will be re-handicapping after each of the four sections, points being lost by a competitor who exceeds his speed in a previous section by more than 5 m.p.h. (It is pointed out that in last year's race the average variation in speed was 1.5 m.p.h.)

Points will be awarded to the first five competitors in each section as follows: 5 for the first; 4 for the second; 3 for the third; 2 for the fourth; and 1 for the fifth.

For the first section the aeroplanes will be handicapped on estimated performance, but no aircraft will be handicapped on less than 140 m.p.h. For subsequent sections the machines will be re-handicapped in accordance with their actual performance. The winner will be the competitor who has scored the greatest number of points.

Generally speaking, the regulations which govern the Wakefield Challenge Trophy Race are identical with those of the King's Cup Race, but the total engine power is limited to 150 b.h.p. at maximum permissible r.p.m., and the minimum handicap speed is 85 m.p.h. Aircraft taking part in the Wakefield race are not permitted to compete in the King's Cup Race.

Details of the courses for the two races have not been announced yet, but start and finish will be at the Birmingham Airport, and the King's Cup Race will be flown over a total distance of 400 miles, divided into four sections of 100 miles each. The course will be a short one of 20 miles, which has to be covered fives times in each section. Thus competitors will be rounding the aerodrome turning point at short intervals.

In the Wakefield race the course is a shorter one, being composed of three sections of 80 miles each (four laps of a 20 miles course).

Prizes

In addition to the King's Cup and the Wakefield Trophy, Viscount Wakefield will present prizes as follows: In the King's Cup Race, £500 for the winner, £200 for second, and £100 for third. The competitor who puts up the fastest time will receive a prize of £100, and the winner in each of the four sections will receive £25.

In the Wakefield Race the prizes are: £250 for first, £125 for second, £50 for third, and £25 for the winner of each of the three sections.

Details of the courses will be announced later.

KING'S CUP AIR RACE

Entrant	Pilot	Aircraft	Engine
Viscountess Wakefield	Capt. E. W. Percival.	Percival Mew Gull	D.H. Gipsy Six, II.
Luis Fontes	Entrant ...	Miles Hawk Speed VI.	D.H. Gipsy Six, I.
John Morgan Barwick	Entrant ...	Percival Vega Gull	D.H. Gipsy Six, II.
Viscount Wakefield...	F/O. G. R. de Havilland.	D.H. T.K.2 ...	D.H. Gipsy Major II.
Carill Stanley Napier	Entrant ...	Percival Gull ...	Blackburn Cirrus Major 150.
Mrs. E. A. M. Reid...	George Lowdell	Reid & Sigrist Trainer.	Two D.H. Gipsy Six, II.
Miss Mona R. V. E. Friedlander	Entrant ...	Miles Falcon VI...	D.H. Gipsy Six, I.
Miss Cecilia Colledge	L. H. T. Cliff ...	Miles Hawk ...	D.H. Gipsy Major, I.
Charles William John Allen.	Entrant ...	Airspeed Courier	Armstrong Siddeley Lynx, IVc.
Alex Henshaw ...	Entrant ...	Hendy 302 ...	D.H. Gipsy Major, I.
Harold Oscar Winter	R. A. Winter ...	Comper Swift ...	D.H. Gipsy III.
Mrs. R. H. Dent ...	James Rush ...	Miles Sparrow-hawk.	D.H. Gipsy Major H.C.

WAKEFIELD CHALLENGE TROPHY AIR RACE

Entrant	Pilot	Aircraft	Engine
Frank Dawson Paul	Entrant ...	Chilton	Carden-Ford.
Richard Henry Shaw	Entrant ...	D.H. Hornet Moth	D.H. Gipsy Major, I.
William Henry Moss	Entrant ...	Mosscraft Sports	Pobjoy Niagara III.
William Henry Moss	Richard Allen Scarf Moss.	Mosscraft Trainer	Blackburn Cirrus Minor.
Hon. Andrew William Henry Dalrymple.	Entrant ...	Chilton	Carden-Ford.
Alexander Reginald Ward.	R. L. Porteous	Chilton	Train 4A01.
Richard Arthur Walley.	Entrant and L. W. Hamp.	D.H. Moth Minor	D.H. Gipsy Minor.
Sqn. Ldr. H. R. A. Edwards.	Entrant ...	Avro Avian IV M	Cirrus Hermes II.
Eric Cecil Gordon England	Charles F. Hughesdon.	Cygnet	Blackburn Cirrus Major 150.
Capt. C. H. Latimer-Needham.	Sqn. Ldr. L. E. Jarman.	Luton Major ...	Walter Mikron I.
Harold Donaldson Rankin.	Entrant and Flt. Lt. L. P. Rowley.	Hawker Tomtit...	Armstrong Siddeley Mongoose II A.
Maj. J. E D. Shaw...	Sqn. Ldr. E. C. Mole.	"Tipsy" ...	Walter Mikron II.
Flt. Lt. C. S. Staniland	Entrant	"Tipsy" ...	Walter Mikron II.
Philip Howard Ford	Entrant and Ronald French.	Blackburn Bluebird.	Cirrus Hermes II.

"Q Planes"

DISCOUNTING aeronautical technicalities, this British film, now showing at the Odeon, Leicester Square, is good entertainment, thanks chiefly to Mr. Ralph Richardson, who plays an Air Ministry Intelligence officer with a nice taste in umbrellas and Irish stew.

The mystery "ship" is an Airspeed Envoy fitted with something novel in superchargers. There are one or two good flying shots of this, and of some Tiger Moths which search for it after agents of a Foreign Power have drawn it from the sky with a Ray.

Research in Canada

CANADA is building new aeronautical research laboratories at Ottawa at a cost of $1,500,000, according to Minister of Trade and Commerce, Mr. W. D. Euler. The new laboratories will be built in conjunction with the Government-owned National Research Council, and will include an aerodynamic laboratory equipped with large and small wind tunnels, a vertical spinning tunnel and accessory equipment, a ship-model testing basin, an engine-testing laboratory, gasoline and oil laboratory, aircraft instrument laboratory and an engineering laboratory. The new building will be constructed outside Ottawa, at the Rockcliffe Airport, to eliminate noise complaints—the present laboratories are in the city.

N.Z. Honour for Sqn. Ldr. Clouston

THE Royal New Zealand Aero Club has instituted the annual award of a gold plaque in recognition of outstanding aeronautical performances by New Zealanders. The first winner is Sqn. Ldr. A. E. Clouston, and the presentation was made in London recently by the N.Z. High Commissioner, Mr. W. J. Jordan.

Useful for Army Co-op.?

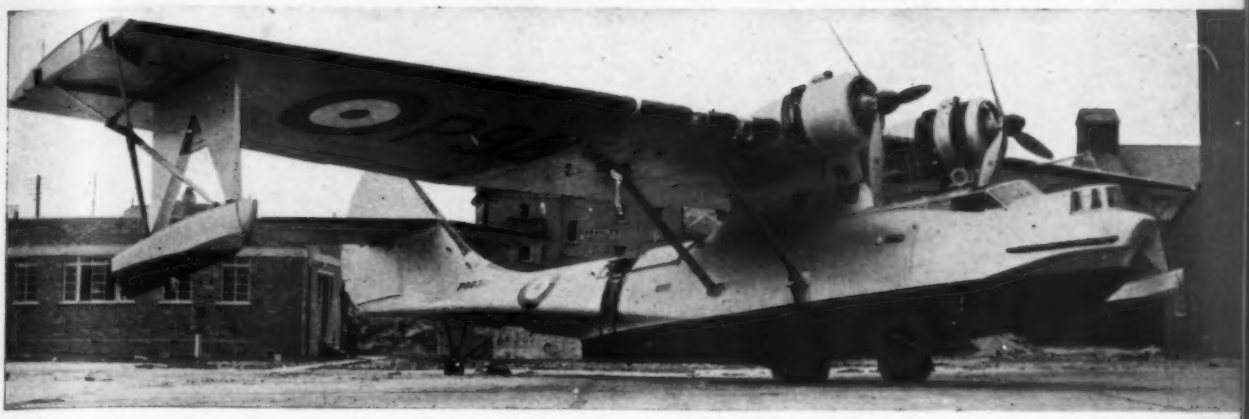
THE following picturesque invitation was recently received at H.Q. of the Ceylon Command, Colombo:—

"I have the honour to thank you to be good enough to place an order in my hands for the worlds best Stratosphere Air Ship which will be completed and handed in 30 days the length to be 1000 feet and a wing span of 100 feet and will be driven by windmill which will be equal to 4 engines of 900 h.p. There will be a Iron retort which will furnish all the 6 cylinders with Ammonia Gas and is non inflammable.

"It will be noiseless and will be the fastest flying machine ever invented by man.

"Thanking for a order accompanied by a cheque for Rs.1000/- as advance. The Engineers in Europe are doing there best to invent such an machine.

"I am Sir, your obedient servant, ——."



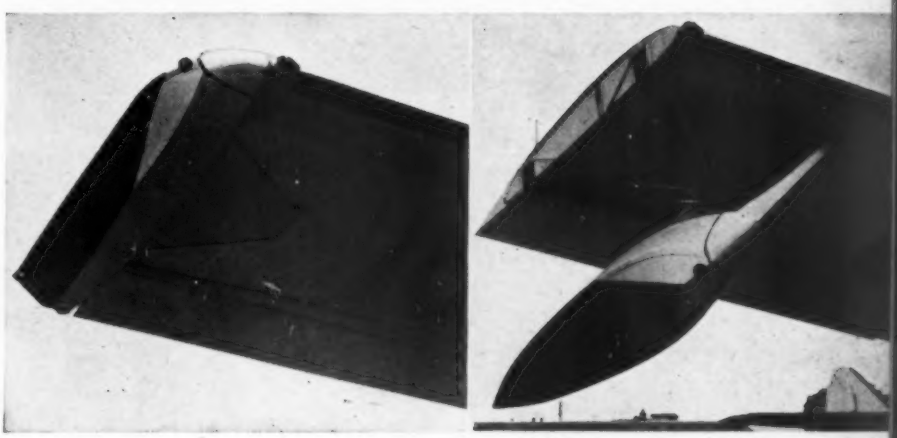
PICTORIAL SPECIFICATION

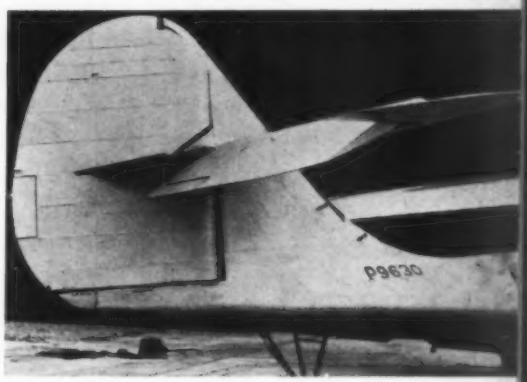
A Photographic Study of a Notable American Flying Boat

(Illustrated with "Flight" photographs)

THROUGH the courtesy of the Air Ministry, who have acquired the machine for experimental purposes, *Flight's* chief photographer was able at Felixstowe last week to "go to work" on the American Consolidated Model 28-5 twin-engined flying boat. This machine was lately flown across the Atlantic from Botwood, Newfoundland, to the Marine Aircraft Experimental Establishment at Felixstowe after having flown to Botwood from the Consolidated factory in San Diego.

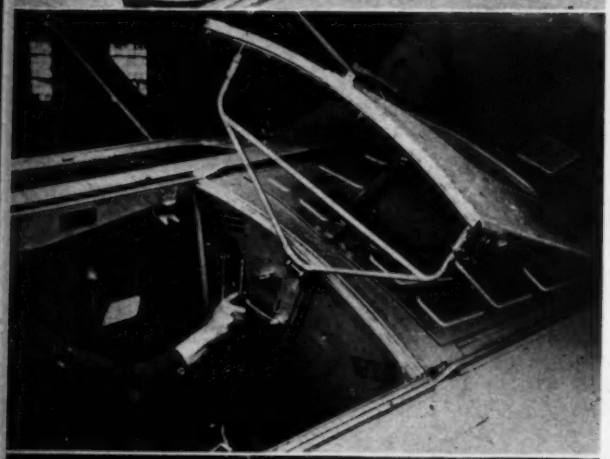
In all essentials the machine resembles the PBY machines, more than 200 of which are being supplied to the U.S. Navy and which have replaced destroyers for scouting and reconnaissance duties. Despite its comparatively low wing loading, the 28-5 is claimed to have a maximum range of more than 4,200 miles. The engines are two Pratt and Whitney Twin Wasps and the top speed is claimed to be over 200 m.p.h.

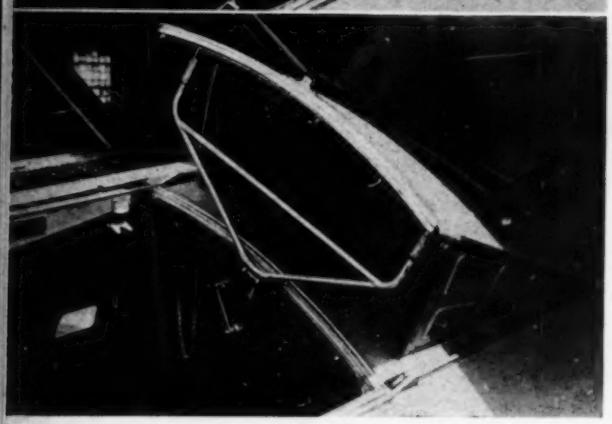




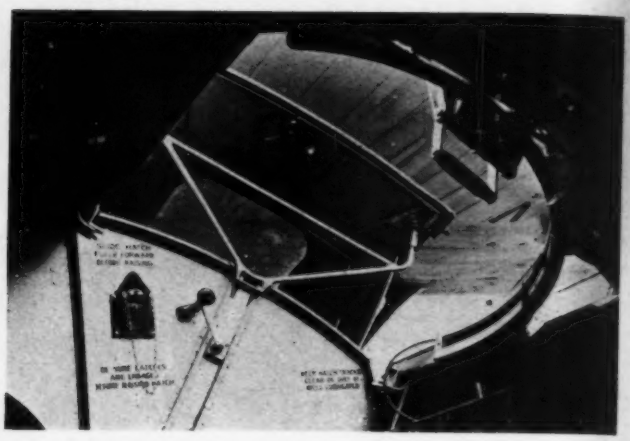
The characteristic features of the Consolidated 28-5—large wing area, retractable wing-tip floats and peculiar hull formation—are apparent in the top view on this page. Below it are close-ups of the float retracted and partially extended while on the right is a study of the tail with its single fin and very large rudder, the former built integral with the hull. Below, on the left, is a view which shows more details of the tail, the broad hull and the termination of the step. Finally, there is a view of the bows showing the location of the bomb aimer's window and the gun turret.

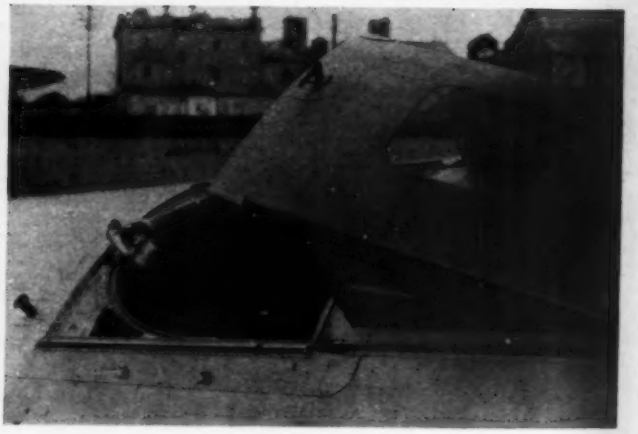
c





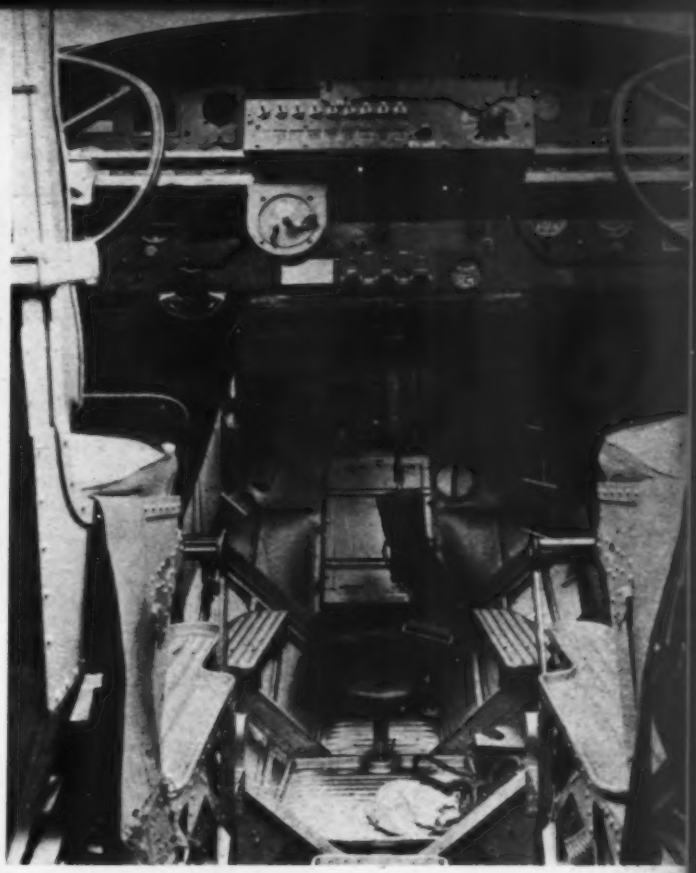
Five views of one of the two deck gun positions. On the left the portion of decking which protects the gunner from the airstream is shown being raised after having been slid forward. The third view shows the side plates in position. Below is a "shot" of the gunner's position from inside the hull and below that is a view showing everything ready for action, except that the gun is not fitted to the track-type mounting which, incidentally, operates very smoothly.

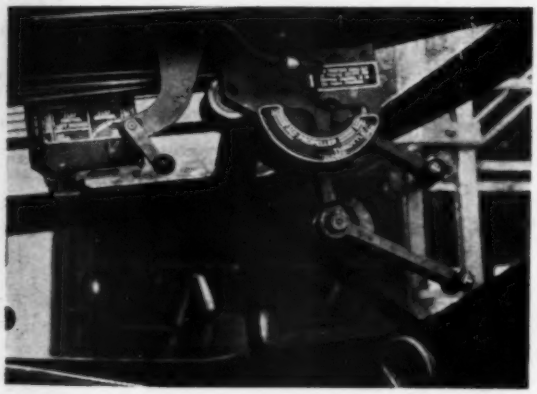




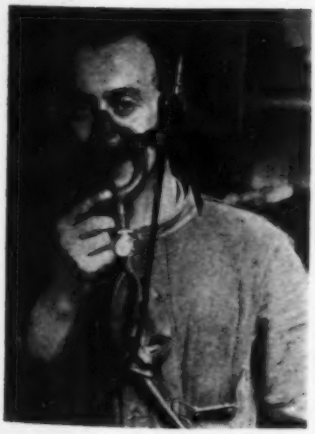
(Left) This is what the Americans call the tunnel gun position. Actually it is not so much a tunnel as an aperture in the floor which is normally filled by the folding section of hull seen above it. This view also shows the section and construction of the rear portion of the hull.

The majority of the engine instruments are grouped on the flight engineer's panel shown above and not in the pilot's cockpit which is seen on the right. The row of switches on the pilot's dashboard transmit orders to corresponding visual indicators on the engineer's panel. The flight engineer sits in the superstructure between the hull and the wing where he may observe the engines directly. He also operates the wing tip floats either manually or electrically. Below are the pilot's throttle and trim controls in the roof of the cockpit.

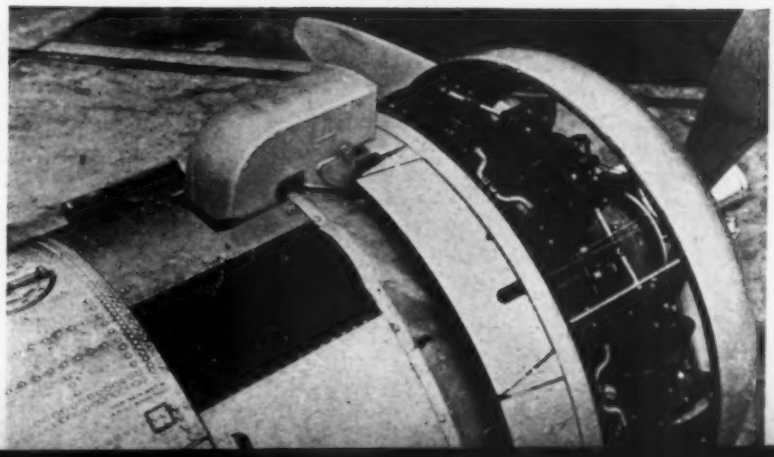


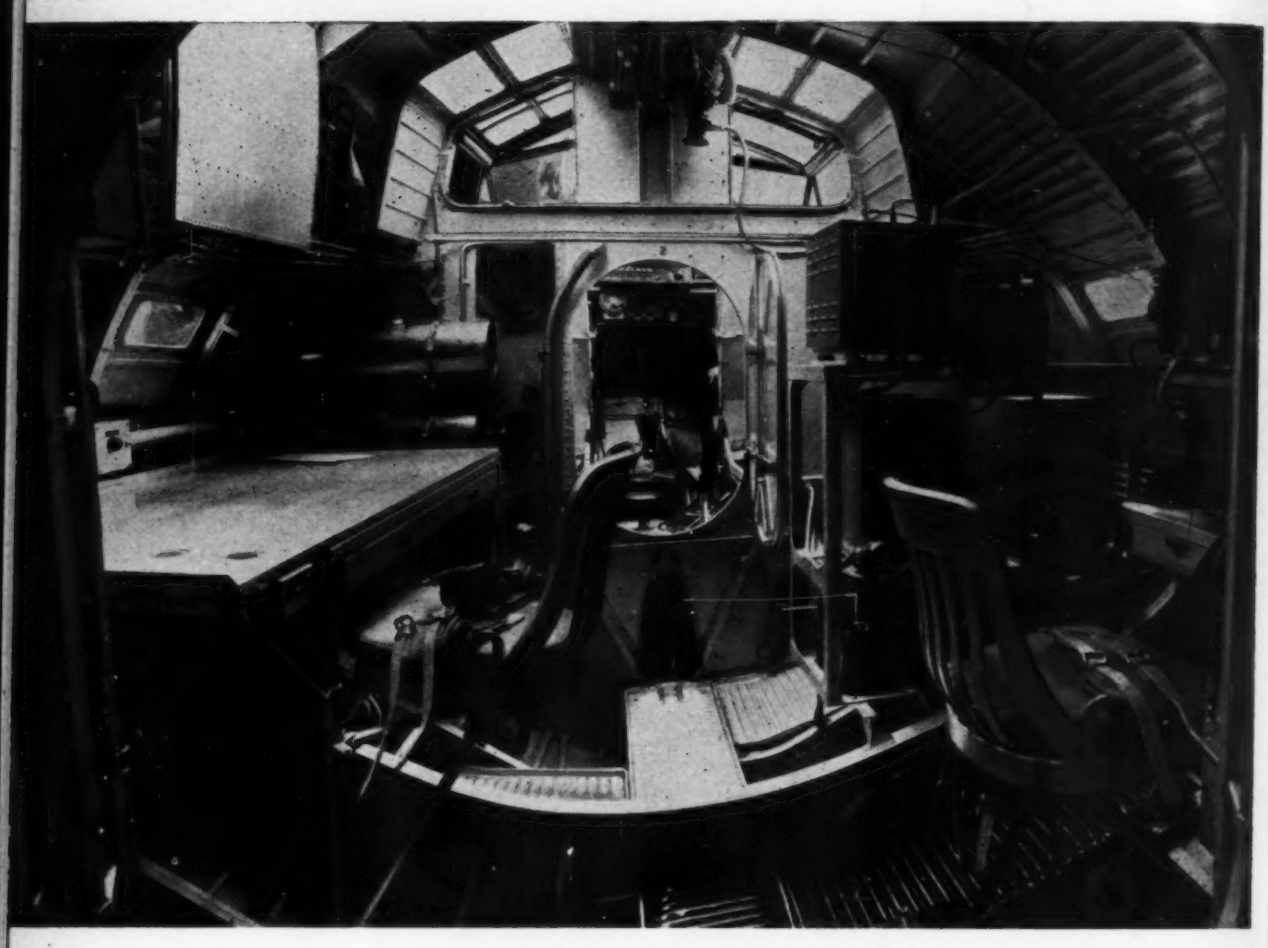


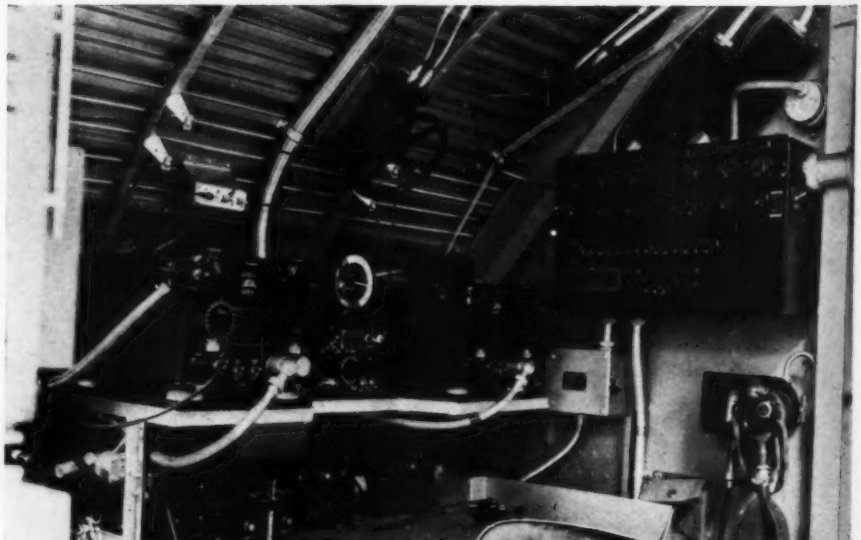
On the right is a view looking aft showing the superstructure in which the flight engineer is housed. A section of the de-icer is also visible. Below is a view of the installation of one of the Pratt and Whitney Twin Wasps with part of the cowling removed.



The oxygen mask as used by the crew of the Consolidated 28-5 leaves the mouth free to use the intercommunication system which extends throughout the boat.







Above is a unique view showing the compartment occupied by the navigator and the wireless operator. The Bendix installation seen on the right and in the lower view comprises main and auxiliary transmitters, two complete receivers, a direction-finder and an inter-communication system which extends throughout the hull and permits both pilots to use the wireless directly when necessary. The loop aerial is extended through the roof and is remotely controlled from the wheel seen in the smaller view over the wireless operator's table. The cylinders by the navigator's table are drinking-water tanks.

THE ROYAL AERO CLUB

News and Official Notices for the Week Ended August 5

Race Entries

TWENTY-SIX entries have been received for the King's Cup air race and the Wakefield Challenge Trophy air race. The King's Cup entries number twelve, and include one by Viscountess Wakefield of a Percival Mew Gull, to be flown by Capt. E. W. Percival. Other interesting entries are the Reid and Sigrist entry and a Miles Hawk entry by Miss Cecilia Colledge, the skating champion. In the Wakefield Trophy race are a C.W. Cygnet entry and a Luton Major. An interesting French engine makes its appearance for the first time in English racing in this event. It is the "Train 4AO1," fitted to a Chilton monoplane.

Speed Records

OFFICIAL recognition has been granted by the Fédération Aéronautique Internationale of the world's speed record obtained by the German pilot, Hans Dieterle, at Oranienburg, on March 30, with a speed of 746.604 km/hr. (approximately 464 miles/hr.). The aeroplane was a Heinkel He 112 U.

Special interest attaches to this confirmation owing to proposals which are being made by the Aero Club von Deutschland at the next conference of the F.A.I. for a modification of the rules governing high-speed records over a measured base. It had been reported that the German record had been made with only one flight in each direction, but confirmation from the International governing body shows that this was not the case and that the full conditions were complied with. The German club's main proposal, however, is that only one flight in each direction should be made instead of two, that the length of the base should be doubled and thus brought up from 3 to 6 km., and that the length of the entry run in which the height must not be greater than a prescribed figure should be increased from 500 m. to 1,000 m. While the acceptance of these proposals would cause an increase in the accuracy of the figures recorded owing to the reduction of the effects of driving on to the course, they will make existing records more difficult to beat.

Geneva Conference

RE-ESTABLISHMENT of feminine records, modification in the rules governing the award of the F.A.I. gold medal, and the waiving of customs duties on fuel and oil used for International air touring are among the subjects to be discussed at the 39th Conference of the Fédération Aéronautique Internationale at Geneva, September 18-24.

The National Aeronautic Association of the United States of America protests strongly against the suppression of women's records for light aeroplanes and light seaplanes. It requests that these records be reinstated in the international schedule.

On the matter of the award of the F.A.I. gold medal, the Aero Club von Deutschland makes a suggestion which, if it is adopted, will overcome deadlocks similar to that which occurred when the rival claims to the medal of the British long-range record flight and Mr. Howard Hughes were being considered last year.

The Royal Aero Club of Egypt makes the proposal about the waiving of customs duties on fuel and oil. It will recommend that the application to touring aircraft of the same principles as now apply to commercial aircraft should be internationally accepted.

Aviators' Certificates

No.	Name.	Club or School	Date
19,252	Wilcox Barnes Wild	U.S.A. Transport Licence	29.7.39
19,253	Leslie Joseph Henry Allsop	Tollerton Aero Club	27.7.39
19,254	Henry Michael Weatherall	Luton Flying Club	27.7.39
19,255	Harry George Whittick	Insurance Flying Club	27.7.39
19,256	Edwina Ratcliff Chamier	London Air Park F.C.	27.7.39
19,257	Derek Alan Walker	London Air Park F.C.	27.7.39
19,258	Clifford Stanley Abram	South Staffs Aero Club	27.7.39
19,259	Peter Marchant	Norfolk and Norwich Ae. C.	27.7.39
19,260	Charles Douglas More Stewart	Bristol and Wessex Ae. C.	27.7.39
19,261	Arthur Leslie Forbes Errington	Wiltshire Flying Club	27.7.39
19,262	Herbert Denham Parker	Southend Flying Club	27.7.39
19,263	William Alfred Collins	Southend Flying Club	27.7.39
19,264	Alfred Molinet	County Flying Club	27.7.39
19,265	Basil N. Fenton-Smith	Autogiro Flying Club	27.7.39
19,266	John Albert Tarratt	Horton Kirby Flying Club	27.7.39
19,267	John Frederick Haffenden	Horton Kirby Flying Club	27.7.39
19,268	John Allan Twiggs	Horton Kirby Flying Club	27.7.39
19,269	Leonie Margurite Cecil Mason	Horton Kirby Flying Club	27.7.39
19,270	Arthur John Guy Evans	Horton Kirby Flying Club	27.7.39
19,271	George Henry Maclellan	Horton Kirby Flying Club	27.7.39
19,272	Archibald George Banks	Horton Kirby Flying Club	27.7.39
19,273	Eric Gordon Shrewsbury	Horton Kirby Flying Club	27.7.39
19,274	Norman Robert Ralph	Horton Kirby Flying Club	27.7.39
19,275	Sidney Charles Peene Nettleton Hammond	Horton Kirby Flying Club	27.7.39
19,276	Richard Charles Dunlop	Horton Kirby Flying Club	27.7.39
19,277	George Henry Stennett	Lincolnshire Aero Club	27.7.39
19,278	John Peter Sadd	Wiltshire Flying Club	27.7.39
19,279	Frederick Cecil Pocock	Wiltshire Flying Club	27.7.39
19,280	Herbert Edward Yaxley	Norfolk and Norwich Ae.C.	27.7.39
19,281	William Alexander Burns	Scottish Flying Club	27.7.39
19,282	Harold William Holland	Bedford Aero Club	28.7.39
19,283	Joan Sheldon Rees	Barnstaple and North Devon Flying Club	28.7.39
19,284	Eric Norman Brundish	Weston Aero Club	28.7.39
19,285	John Norman Gibbs	Worcestershire F.C.	28.7.39
19,286	Frederick Harold Rothwell	Doncaster Aero Club	28.7.39
19,287	Kenneth Walter James Rice	Norfolk and Norwich Ae.C.	28.7.39
19,288	Percival Richard Browning	Airwork Flying Club	28.7.39
19,289	John Henry Franks	Airwork Flying Club	28.7.39
19,290	Lee Round	Midland Aero Club	28.7.39
19,291	Robert George Hillier	Malling Aero Club	28.7.39
19,292	Gordon Ernest Butler	Isle of Wight Flying Club	28.7.39
19,293	Thomas Geoffrey Griffiths	Eastbourne Flying Club	28.7.39
19,294	Anthony Leslie William Veale	Exeter Aero Club	28.7.39
19,295	Frederick Walter Willsou	Southend Flying Club	28.7.39
19,296	Alexander Francis	Southend Flying Club	28.7.39
19,297	Herbert Ernest Hyman	Southend Flying Club	28.7.39
19,298	Richard William Purser	Exeter Aero Club	27.7.39
19,299	Alastair Charles Taylor	Royal Air Force	28.7.39
19,300	Lucy Duncombe	Bedford Aero Club	29.7.39
19,301	George Anthony Davison	North Staffs Aero Club	29.7.39
19,302	Wilfred Kenneth Eardley	North Staffs Aero Club	29.7.39
19,303	Peter Geoffrey Cane	Herts and Essex Aero Club	29.7.39
19,304	Ernest Edward Perry	Horton Kirby Flying Club	29.7.39
19,305	Charles Norman Davies	Horton Kirby Flying Club	29.7.39
19,306	Joseph William Bird	Tollerton Aero Club	29.7.39
19,307	Thomas Pow	Scottish Flying Club	29.7.39
19,308	Kenneth Hugh Varney	Scottish Flying Club	29.7.39
19,309	Ernest Greig	Scottish Flying Club	29.7.39
19,310	Frank Walter Joy	Malling Aero Club	29.7.39
19,311	Percy James Flynn	Midland Aero Club	29.7.39
19,312	Bernard Henry Mangham	Midland Aero Club	29.7.39
19,313	Michael E. Croskell	York and Leeming F.C.	29.7.39
19,314	Henry Trevor Fairclough	South Staffs Aero Club	29.7.39
19,315	Thomas Henry Dingle	Bristol and Wessex Aeroplane Club	29.7.39
19,316	Edmund Stephen Powers	London Aeroplane Club	29.7.39
19,317	Douglas Fraser Turner	London Aeroplane Club	29.7.39
19,318	Arnold Beaupre Eiloart	Brooklands Flying Club	29.7.39
19,319	Violet Marie Gordon	Barnstaple and North Devon Flying Club	29.7.39
19,320	William Henry Tolman	Barnstaple and North Devon Flying Club	29.7.39
19,321	Ewart Cecil Sell	Worcestershire F.C.	29.7.39
19,322	Tom Consitt	Hull Aero Club	29.7.39
19,323	Frank Roe	Hull Aero Club	29.7.39
19,324	John Adam Breckell	Coventry Aeroplane Club	29.7.39
19,325	Leslie George Richards	Coventry Aeroplane Club	29.7.39
19,326	Patrick Stewart Wilson	Liverpool and DistrictAe.C.	29.7.39
19,327	Harry Ramsden Whitty	Liverpool and DistrictAe.C.	29.7.39
19,328	James Henry Charles Torr	Liverpool and DistrictAe.C.	29.7.39
19,329	John Morgan Johnson	York and Leeming F.C.	31.7.39
19,330	Ernest Frederick Yates	South Staffs Aero Club	31.7.39
19,331	Robert Springett Brutton	Exeter Aero Club	31.7.39
19,332	Leonart Ernest Townsend	Autogiro Flying Club	31.7.39
19,333	John William Driver	Yapton Aero Club	31.7.39
19,334	Arthur Herbert Sheffield	Midland Aero Club	31.7.39
19,335	Alfred William Fletcher	Airwork Flying Club	31.7.39
19,336	Alfred John Clark	London Transport F.C.	31.7.39
19,337	Dorothy Grant	Lincolnshire Aero Club	31.7.39
19,338	John Huxtable Burgess	Barnstaple and North Devon Flying Club	31.7.39
19,339	Joseph Thomas Leslie Mallard	Lancashire Aero Club	31.7.39
19,340	George Albert Lovell	Wiltshire Flying Club	31.7.39
19,341	Cynthia Branfill Rew	Wiltshire Flying Club	31.7.39
19,342	Laurence Pleydell Bouverie	Cotswold Aero Club	31.7.39
19,343	William Shovlin	Scottish Flying Club	31.7.39
19,344	William Ernest Legard	No. 4 F.T.S., R.A.F. Abu-Sueir, Egypt	31.7.39
19,345	Edward Robert MacDermot	Royal Singapore F.C.	31.7.39
19,346	John Denzil Moxham	London Aeroplane Club	1.8.39
19,347	Leon Frank Whiten	Lincolnshire Aero Club	1.8.39
19,348	Cecil Scarborough	Lincolnshire Aero Club	1.8.39
19,349	Alec George Bradshaw	Peterborough Flying Club	1.8.39
19,350	Lionel James Green	Barnstaple and North Devon Flying Club	1.8.39
19,351	Noel McClean	Newcastle Aero Club	1.8.39
19,352	John Robert Leslie Dunn	Norfolk and Norwich Ae.C.	1.8.39
19,353	Herbert Alec Shaw	Yorkshire Aeroplane Club	1.8.39
19,354	Kenneth Anthony Warren	Lincolnshire Aero Club	1.8.39
19,355	Robert Wharton Gaythorpe	Doncaster Aero Club	1.8.39
19,356	Eric James Woods	Southend Flying Club	1.8.39
19,357	Sidney Eric Bailey	Thanet Aero Club	1.8.39
19,358	George Maxwell Pitts-Tucker	Barnstaple and North Devon Flying Club	1.8.39
19,359	David Mackie Sleep	Malling Aero Club	1.8.39
19,360	Harry Spencer Grimsey	Ipswich Aero Club	1.8.39
19,361	Basil Willoughby Brennan	Isle of Wight Flying Club	1.8.39
19,362	Alfred Messenger Facer	Luton Flying Club	1.8.39
19,363	Ronald Wilson Rhodes	Blackpool and Fylde Ae.C.	1.8.39

IN SERVICE : The first Junkers Ju.90 to be seen in this country arrived on the normal Berlin-London run on August 1. The impressive size of this forty-seater is shown by the relative smallness of the Marcel Bloch on the right. The "accident" on the left is merely a group of Imperial machines, including two Frobisher-class and one Ensign-class liner. The Ju.90's tail unit is interestingly complicated.

Topics of the Day

LET US COMPLAIN

—"*Indicator*" *in Liverish Mood*

At times, usually at about three in the morning, I tend to think that the aviation industry must be the most unbusinesslike one in the world. Unfortunately, it has tended to be closed, at least until comparatively recently, to anybody outside the little clique of people who actually ran it, and in any case no newcomer could possibly have the necessary experience to be successful in introducing more normal business methods to the trade. The trouble seems to be that the entire industry has been too consistently spoon-fed with orders from people to whom money, since it comes easily, is of little account. Neither is the Air Ministry very good at complaining—and the Service pilots and others are simply not permitted or able to complain except among themselves.

Consequently, something like a mantle of silence covers the whole business, and all that the average person can hear about it are fourth-hand stories of multiple forced landings, of untractable undercarriages, and of replacement tails which, after delivery, will not fit. Only when the civil people start to use the industry's products do we really begin to learn something about them. With money-no-object maintenance arrangements, and the already mentioned mantle of silence, all sorts of little troubles are ignored, but the transport operator, who must try (now with the help of a small or large subsidy) to make ends meet, sometimes finds that the good aeroplanes and good engines are by no means good enough.

Recently there has been a good deal of talk, some of it nonsense, about the relative superiority of American engines. If, at this very moment, one or two of these engines are better and more reliable, power for power, than their British counterparts, then it must be because of the considerable power wielded by civil operators in America.

Until the last year or so a very large proportion of the American engine and aircraft manufacturers' sales have been to civil people and not to the less critical or more heavily muzzled Army and Navy Air Corps. Nobody is going to tell me, for instance, that the Wright Cyclone and the P. and W. Wasp Junior are essentially better than any power units which we can make over here—in fact, when these units were first used in Europe, the operators, I believe, had to carry a special stock of crankshafts and other vital items which, if they did not actually break in the air, were often found to be cracked when the engines were taken down.

The point is that these initial troubles are no longer experienced—and that because the civil people simply would not tolerate them. Furthermore, the manufacturers and operators got together and combined certain improvements with a more careful handling technique by the pilots. Quite a lot of the trouble was caused by the fact that pilots, unused to such large maximum-power outputs, tended to use everything there was, not only for the take-off, but during the initial climb as well. In due course it was discovered that from all but about two airports there was no necessity to use this maximum output, and certainly not to use it once the machine was clear of the aerodrome boundary. Probably the appearance of constant-speed, as opposed to two-position, airscrews has also had something to do with the increased reliability.

Finding Out

Nevertheless, it does not help at all to pretend that these American engines are not good. To give just one indirect proof, the Douglas D.C.3 could never have survived as a popular type if the engines had not been as reliable as they are. One of the D.C.2s might be able to clamber away out of danger if one engine fails immediately after the take-off, but the D.C.3 cannot, although it will fly perfectly happily once the undercarriage and flaps are up, and some reasonable margin of height and speed has been obtained. Possibly there have been cases of engine failure at the dangerous moment immediately after the take-off, but I have never heard of one. All but about five per cent. of the accidents which have occurred to these machines have been due to a combination of bad weather, navigational errors and bad judgment. It is significant that, of half a dozen British engines about which complaints are rarely heard, only two of them are fitted to civil types. The others may be doing 450 hours between each overhaul without failure, but they may, on the other hand, be ripped to pieces at the end of every 100 hours. We don't know. The moral is that if you want to find out all about the troubles to which your engine or aeroplane is subject, give it to the airline operator.

Aircraft and engine design improvements appear to

go in waves in the different countries, and if, during the last few years, America has been somewhat ahead in certain particulars, I think we are now likely to go on top ourselves. Not only are there a dozen really first-class military and civil aeroplanes, and two or three exceptional engines already in use, but some of the designs coming along should give this country a very definite lead. So far as engines are concerned we shall see what we shall see when some of the really high-powered units make their appearance. These may be in production and use while some of the similar sized American engines are still recovering from inevitable preliminary troubles. One of our newest is likely to be a considerable surprise to everybody.

In the case of civil aircraft design, we have only just begun to try really hard. One of the more serious faults of some British types has been in the control and instrument layout. With machines being produced in such comparatively small numbers nobody has bothered very much about pre-planning, and the result is that the few modern British civil aeroplanes at present in service have layouts which are distinctly untidy in comparison with those of some American transports which have been in use for several years.

Of course, the operators have been partly at fault because they have not always told the manufacturers what they wanted. And, in any case, only in the last year or two have the requirements settled down and machines become so complicated in operation that the most careful attention has had to be paid to the control layout in the preliminary stages of design. To quote an example, the Lockheed 14 simply would not be flyable in the hands of a normal crew if this layout had not been most carefully considered. Nobody, least of all the pilots, imagines that the Fourteen's control and instrument layout is absolutely perfect, but everything is "getatable" and "seeable," and there is simply no room for anything else. If the designers had forgotten some essential item of equipment they would have had to start all over again, whereas in some of our civil machines the forgotten items are just hung on to the ceiling or nailed into the dashboard where there happens to be a space.

I often wonder whether the big people in the industry and the Air Ministry are so surrounded by yes-men that they never hear the real truth about some of their products. Otherwise, surely, one or two quite easily rectified faults would be dealt with rather more quickly than is sometimes the case—and I include faults of organisation with the plain mistakes. The case of *Cavalier*, which was lost betweeen New York and Bermuda, was sufficiently black, yet very little was said about it at the time.

The official accident report, when it duly appeared many months after the event, explained, quite rightly, that there was nothing essentially wrong with the equipment when used for normal operations. It simply happened that for months before the accident Imperial Airways' pilots had been discovering week by week the fact that the carburettors did, in extreme conditions, ice up, and that it was not always possible to clear them by throttle action. Until that particular and fatal day they always had cleared them eventually or had completed the flights on what remained of the power. So nobody did anything about it.

Neither the engine nor the aircraft manufacturers could possibly have discovered the trouble before the type went into service, but something ought to have been done as soon as the first case had come to light, and without waiting for the loss of life.

Not very long ago a machine, luckily only carrying its crew and one passenger, was lost in the north of England because the operator could get no reply from the area D/F station. From what can be gathered the silence remained complete for forty minutes and the pilot of another machine, which was flying in the same area, was having similar trouble. In the circumstances the two pilots had to make up their minds, and, as the signals received by each machine were loud enough to suggest that there was a very real chance of collision, they checked each other's altimeter reading and decided, thereupon, to alter their relative heights. One chose to climb and the other to descend—into a hillside. Neither knew quite where he was and no bearings or positions could be obtained.

Conversation Piece

1929. *Q.* "Hello. Do I pay a landing fee here?"

A. "Great Scott, No. Where've you come from? London? Nice looking Gipsy you've got there. Come in and have tea. (Nuisance; have a lesson in two minutes, but must make the man feel at home.) What was the weather like down south? Have you seen the new D.H. cabin machine? Do you want a lift into the town? . . ."

1939. *Q.* Hello. Do I pay a landing fee here?"

A. "No. (But we certainly resent your using our field without permission.) Tea? No teas served after 4.42. Want to go into the town? There's a bus service along the main road. Twenty minutes' walk. Don't know when they pass."

INDICATOR.

FROM the CLUBS and SCHOOLS

LONDON.
THE flying time for the week ended August 4 was 129 hr. 10 min. Miss Valdor, Messrs. A. Birkett, D. Campbell and R. M. Ingram made their first solo flights.

ISLE OF WIGHT.
During the week ended August 6 a total of 76 hr. 10 min. was recorded.

THANET.
Owing to wind and rain during the week ended July 31 only 86 hr. were flown. Mr. D. H. Coleman made his first solo flight.

YAPTON.
The C.A.G. and Club flying total in the first week of August was 30 hours. There are now 78 members of the C.A.G. under instruction.

SOUTH COAST.
Weather conditions are still holding up flying instruction very badly. However, in the C.A.G. section Messrs. A. H. Vicars, C. B. Gardner, W. Ripley and H. W. Palmer went solo last week.

IPSWICH.
Adverse weather conditions over the week-end seriously affected flying, but 119 hr. were flown. Messrs. H. Upshall, A. S. Button, K. Parker, K. McLaren and J. Hotson went solo.

INVERNESS.
The 34 hours flown during the week ended July 31 was a good total considering that, at the moment, there is only one instructor and one machine available.

DONCASTER.
Total flying time for the week ended August 5 was 36 hr. 48 min. Messrs. R. Tucker and J. Millet made their first solo flights.

PLYMOUTH
Showers, and 3½ days when no flying was possible, cut down the flying time to 58 hr. during the week ended July 31.

BROOKLANDS
A total of 180 hours was recorded during the week ended August 4. Mr. R. C. Thompson made his first solo, and Mr. Frank Fox has passed the "technicals" for his "B" licence.

REDHILL.
The flying time for the week ended August 5 amounted to 155 hr. 15 min. Mr. A. Brown went solo. Nine machines went to the Shoreham dawn patrol and two crews obtained free breakfasts.

PORTSMOUTH.
Club and C.A.G. members logged 47 hr. in the first week of August. Sixty-four members of the C.A.G. are now flying solo, and several others are ready to start.

NORFOLK AND NORWICH.
Eighty-four hours were flown during the week ended August 5. A party was arranged by Capt. W. A. Ramsay to inspect the Short works at Rochester.

CINQUE PORTS.
Sixty-two hours was the flying time recorded during the week ended August 6. The week-end was devoted to the Folkestone Aero Trophy race (duly reported on the following pages).

MARSHALLS'.
A total of 115 hr. was recorded during the week ended August 5. In the C.A.G. section Messrs. A. Thorpe and F. W. Arnold made their first solos. The club has now taken delivery of its second Moth Minor.

(*Continued at foot of p.* 137).

THE FOLKESTONE TROPHY RACE

Cinque Ports Meeting Favoured with Fine Weather : Hon. A. W. H. Dalrymple (Chilton), Wins at 126 m.p.h.

BY averaging the excellent speed of 126 m.p.h. over three laps of a nineteen-mile course, a new Train-engined Chilton, piloted by the Hon. A. W. H. Dalrymple, won the Folkestone Aero Trophy race, organised last Saturday by the Cinque Ports Flying Club. Second and third places went to two of the club's Tiger Moths, flown respectively by Messrs. R. M. Hackney and J. A. M. DuPort, while the best time of the day was made by Capt. E. W. Percival, who covered the course at the remarkable speed of 230.5 m.p.h.

Quite a number of visiting aircraft dropped in during the day for the race and heats at Lympne, in spite of the most threatening weather forecast of torrential rain, with visibility closing right down. Contrariwise, the sun shone with brilliance for practically the entire duration of the racing to the immense relief of the organisers—but then the Cinque Ports Club is usually very fortunate with the weather.

The Folkestone Trophy race is held over a course that lies in an easterly direction in relation to Lympne. The first turning point at the Capel Hangar, perched high on the cliffs to the north-east of Folkestone, is nine miles away. The next leg, a short one of 2.3 miles, is to Folkestone Harbour pier and is followed by a straight course along the coast direct to the Hythe gasometer (now camouflaged) before reaching the last leg of 2.6 miles back to Lympne.

Last Saturday the wind—what little there was of it—lay in the north-east, with the result that most competitors maintained their altitude at the Capel Hangar turn all the way to the Lympne turning point via Folkestone and Hythe.

As the starter's flag falls, the Train-engined Chilton starts off in the final for the Folkestone Trophy race. Piloted by the Hon. A. W. H. Dalrymple, the Chilton won at 126 m.p.h.

Owing to the somewhat hazy conditions it was quite difficult to recognise the aircraft as they approached from the direction of Hythe until practically the last minute. This fact not only kept the large crowd of spectators guessing, but also the commentator, Mr. Tony Morris, who did a very good job of work under rather trying conditions.

Soon after mid-day the aircraft in the first heat were taxying over to the starting point. In this heat the limit man was Mr. F. Dawson Paul in the Chilton-Ford, Alex Henshaw, with "Pa," were scratch in their Vega Gull.

By the end of the first lap Du Port's Tiger Moth had perceptibly gained on the limit man. The V.E.F., piloted by Robert Bruce, rounded the turning point on the aerodrome boundary in a remarkably tight turn to be followed by H. O. Winter's Comper Swift. Unfortunately Winter misjudged the turning point, cutting across on the inside.

The finish of this heat was a credit to the handicappers, Messrs. Dancy and Rowarth. The first machine to appear over the trees from Hythe was Du Port's Tiger. As it approached the boundary Bruce in the V.E.F. rocketed past to win by one second. After a brief pause Miss Mona Friedlander's Falcon appeared level, as far as the eye could judge, with Winter's Comper, but as the pair of them crossed the line the Falcon was just in the lead. Unfortunately the Comper's indiscretion on the first lap, when it missed the Lympne turning point caused it to be disqualified. Even so, Winter had succeeded in averaging the remarkable speed of 152 m.p.h.

After lunch the six starters in the second heat were waiting on the line promptly at 2.30 p.m. In this heat were one or two interesting machines. The scratch man was Capt. E. W. Percival with his gleaming Mew Gull. Tommy Rose was there with the faithful B.A. Eagle and Geoffrey De Havilland in the T.K.2. A newcomer was A. R. Ward's Chilton, piloted by the Hon. A. W. H. Dalrymple. This machine was powered wih a 40 h.p. Train engine and with the resultant modifications to the engine cowling, looked more than ever like a fighter in miniature.

On the first lap Sqn. Ldr. E. L. Mole had trouble with the petrol feed in his Tipsy and near the Capel turn was forced to put down hastily in a field. Unfortunately, he did not see until the last moment that the Tipsy was heading straight for the power cables of the Grid Scheme. Actually the Tipsy struck the cables a glancing blow before running into the ground at high velocity. Fortune was with Sqn. Ldr. Mole, for the Tipsy, although rather badly damaged—it had run through a hedge into the road—did not catch fire. The pilot, however, was rather badly cut and had to have some stitches put in his leg before returning.

In the foreground are the handicappers and starters of the Folkestone Trophy race—Messrs. Dancy and Rowarth. The machine in the foreground, the Tiger Moth piloted by R. M. Hackney, finished second.

Within a few yards of starting, Geoffrey De Havilland accelerates past the line of spectators with the tail of the T.K.2 well up.

The second lap of the heat saw the Chilton overtake Hackney's Tiger, while Tommy Rose came into the picture by lying third. However, Capt. Percival's Mew Gull was gaining rapidly and obviously not losing a fraction of its speed on the turns. The finish saw the Chilton win comfortably from the Tiger, while the Mew Gull came home into third place, the T.K.2 and Tommy Rose's Eagle having to be content with fourth and fifth.

For the final the first four were taken out of each heat. Shortly after 4 p.m. the finalists were waiting for the starter's flag. The first off was Du Port's Tiger, to be followed 27s. later by R. M. Hackney in a similar machine. Next was the Train-engined Chilton followed by Bruce's V.E.F., Miss Friedlander in the Falcon, the Henshaws in their Vega, the T.K.2 and finally Capt. Percival's Mew Gull.

At the end of the first lap Hackney was right in the slipstream of Du Port's Tiger. Alex Henshaw, already in sight of Miss Friedlander's Falcon, dived down out of sight after the Lympne turn to dodge as much as possible the light north-easterly breeze. In the meantime both the T.K.2 and the Mew Gull were clearly closing up on the leaders more than the handicappers would have liked. On the second lap the order was maintained but not for long.

The commentator, from his viewpoint on top of the hangar, said he could discern a biplane approaching. It was definitely Hackney's Tiger. But almost as soon as this was appreciated by the spectators, a low-wing monoplane was sighted. Was it the V.E.F. or the Chilton? The commentator was obviously putting his shirt on the former, but not until the last minute when it had overtaken the Tiger was it seen that he was wrong. It was the Chilton, magnificently piloted by Dalrymple. Second and third came Hackney's and Du Port's Tiger Moths, with the V.E.F. lying fourth. Both Geoffrey De Havilland and Capt. E. W. Percival were too handicapped to win the places which their masterly flying deserved.

(Left) The winner, the Hon. A. W. H. Dalrymple, pays homage to the inevitable autograph hunter (Right) Mrs. Ann Davis has a smile for R. M. Hackney when presenting him with the second prize.

FINAL

Entrant	Pilot	Aircraft	Start	Finish	Nett Time	Place	Average Speed
			min. s.	min. s.	min. s.		m.p.h.
A. R. Ward	Hon. A. W. H. Dalrymple.	Chilton ...	2 59	31 06	29 07	1st	126
Mrs. Ann Davis ...	R. M. Hackney ...	Tiger ...	0 27	31 45	31 18	2nd	113
J. A. M. Du Port ...	J. A. M. Du Port ...	Tiger ...	0 00	32 10	32 10	3rd	110
P. N. S. Avery ...	Robert Bruce ...	V.E.F. ...	7 24	32 26	25 02	4th	141.5
Capt. E. W. Percival...	Capt. E. W. Percival	Mew Gull ...	17 38	32 59	15 21	5th	230.5
Alex Henshaw ...	Alex Henshaw ...	Vega Gull ...	11 39	33 08	21 29	6th	164.75
Lord Wakefield ...	G. De Havilland ...	T.K. 2 ...	13 34	33 21	19 47	7th	179
Miss M. Friedlander ...	Miss M. Friedlander	Falcon ...	10 50	33 25	22 25	8th	156.5

FROM the CLUBS and SCHOOLS

(*Continued from p.* 135).

EXETER.

Flying time was curtailed for 2½ days during the week ended July 31; however, 134 hours were flown. Miss Slagg, and Messrs. W. Atkinson, W. T. Daniel, H. Fullager and K. D. Russell made their first solos.

HANWORTH.

For the fortnight ended August 4 C.A.G. and club members recorded 350 hours' flying. Messrs. L. Greenwood, F. Grillage, J. Harris, N. Head, G. Hughes, M. Lucani, F. Rammelt, C. Roberts, E. Robinson, J. Taylor, A. Tracey, H. de Pinna Weil, A. Westwater and E. Wright went solo.

HERTS AND ESSEX.

During the fortnight ended August 3 a total of 250 hr. 20 min. was recorded. First solo flights were made by Messrs. P. C. Cane, C. Cohen, G. P. Glenister, C. D. Russell, D. F. Buckle, J. J. E. Walker, A. S. Anson, W. Daniels, A. C. Geary, P. B. Coulson, N. H. Wilkinson, F. R. Sorge, H. E. Hole, S. A. Saddleton, S. A. Symonds, R. C. de Wilde and A. L. Howitt.

HORTON KIRBY.

During the week ended August 3, 117 hr. were flown. First solo flights were carried out by Messrs. D. Wright, H. K. Smallwood and S. L. Alexandroff. Mr. A. Drew has passed his tests after taking an instructor's course and has been duly granted an endorsement to his licence.

WEST SUFFOLK.

Forty hours' flying was recorded during the fortnight ended August 6. New C.A.G. members are Messrs. G. M. Bloom, R. H. Scrimshaw, T. C. Hopgood, H. E. Richardson, G. T. Hurren and G. W. Tickner.

WESTON.

The introduction of the new Piper Cubs stimulated flying last week and in spite of two days' heavy rain 113 hr. were flown. The C.A.G. took part in a combined A.R.P. exercise on July 28, representing enemy aircraft.

LUTON.

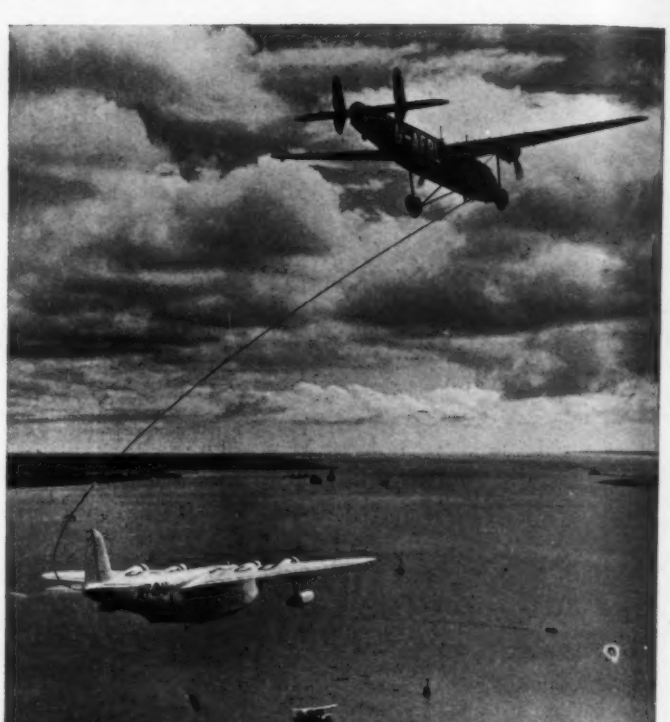
Weather interfered considerably with flying throughout the last month; however, 265 hr. 5 min. were recorded. Mrs. H. M. Richardson, Miss J. Gaston and Messrs. P. W. Stanley, J. Lawson, J. R. Le Claire, C. H. Cosmelli, L. M. Hawkins, J. B. Rogers, A. M. Facer, H. M. Weatherall, R. Stewart, R. Biggs, S. J. Buckley, J. C. Saxby and J. Pasmore all went solo.

OVERSEAS.

PENANG.

A total of 151 hr. 30 min. was flown during the month of June. The competition for the Law Cup was held, and resulted in a win for Mr. Lockyear with 75 points. Several machines from other Malayan clubs visited Penang.

COMMERCIAL AVIATION



PREPARING FOR THE FIRST : A photograph taken last week at Southampton showing *Cabot* receiving fuel from a Harrow tanker. Last week-end saw *Caribou*, commanded by Capt. J. C. Kelly Rogers, with Capt. S. G. Long as chief officer and Mr. B. C. Frost as first officer, make her first regular Atlantic crossing after being refuelled at Foynes. The machine, carrying 1,055 lb. of mail, reached Newfoundland at 10.10 p.m. (G.M.T.) on Saturday and was due to leave New York, on the return flight, yesterday. *Cabot* will make the next eastward crossing on Saturday.

THE WEEK AT CROYDON

"A. Viator," in his Transport Comments, Discusses Militarised Civilians, Slow Diplomatic Travel, Aerial Obstructions and "Lost Airport Plans"

THE new Junkers Ju.90 has been seen at Croydon lately and is a handsome aeroplane, cruising, I should say, at about 190-195 m.p.h. It is not quite as big or as heavy as the "E" class machines, but is faster and, moreover, it is one of the few types I have heard talked of as a 40-seater which really has 40 seats and carries 40 passengers. D.L.H. have put this machine on the Berlin-London service.

One of the newspapers called the machine a bomber, which raised some indignation, I am told, on the part of its owners—who, if they are wise, will retort good-humouredly that the Ensign is a troop carrier. It's all nonsense, anyway, for any fast commercial machine is a potential war craft, just as there are certain types of merchant vessels which may be armed in war time.

General Huntzinger, one-time member of a French military mission to Turkey, came in to Croydon last Wednesday by Air France. He is, I am told, to act as liaison officer between the French and British members of the military mission to Moscow. Let us hope the mission will move quicker than the political one, otherwise it won't be liaison officers who will be wanted, but male nurses skilled in matters concerned with second childhood and senile decay.

Incidentally, it augurs ill for the progressive-mindedness of the military mission that they hired a boat—I trust neither a sailing packet nor a paddle steamer—to go to Moscow (via the Azores, was it?) in order to miss the Kiel Canal, whereas there is every inducement to go to Moscow by air. Speed should be the slogan in these matters, and there can be no advantage in the ruminative attitude of mind induced by sea voyaging.

Commercial pilots are having a grim time these days, what with large-scale exercises and small-scale but no less dangerous exercises by those young officers who decide to fly in droves through clouds in search of some jolly spot (ultimately) at which to lunch. Then there are the barrage balloons, which are not in cloud except when clouds gather round them, but which are apt to break loose and drift trailing lengths of steel cable behind them.

By the way, I wish our Croydon balloon boys, the ones in charge of the carnival-type balloons they use for testing cloud height, would be a bit more careful. On Sunday morning I thought I was being haunted by the missing portion of the headless horseman when a large expressionless purple face hovered outside my window. It was one of their nasty little balloons, but the point is that the base of lowest cloud was nowhere near my window-sill.

Works and bricks are having a lovely time building wooden enclosures wherein to meditate between spells of feverish activity with concrete mixers, pneumatic drills and other nerve-shattering devices. I noted with alarm, incidentally, that no sooner had the Ministry handed secret plans of aerodromes to a contractor than these were left in an unattended car, according to immemorial tradition, and stolen. These were probably the ten-year-old schemes for improving Croydon, which could not be put in hand earlier, as they were incubating at the bottom of some tremendously deep letter tray. It would have been too bad if they had been lost.

The tragic occurrence of last week, when an unfortunate stranger walked into an airscrew, shows how unwise it is to let so many casual strangers wander about the airport. This is no time to have unauthorised persons all over the place.

Mr. Hore-Belisha flew to Paris one day last week accompanied by his smile, hat, and eyebrows. He went by Air France, but (*pace* Perks) he did so because Imperial Airways were full up. I fear Perks will have an awfully feverish time, blood continuously on the boil and all that, when the mooted pooling scheme between B.O. Airways and Air France comes into being (if and when it does), for passegers will then, as is but logical, simply take the next machine to Paris irrespective of what its national registration happens to be.

I am told that the new hangar, where *Scylla* was stowed and fell into the drainage system, is not really ready. It has gone up in record time, and is said to be capable of housing three "E" class machines, and it is badly needed in these torrential times. Everything is perfect except for the fact that there is, as yet, no lighting, so that it is useless to put "E" or "F" types in it because they cannot be worked on at night. Would you believe it?

A. VIATOR.

COMMERCIAL AVIATION (CONTINUED)

Selling Air Transport

ONCE again Scottish Airways (Northern and Scottish when the last issue appeared) have produced a really comprehensive guide to their air routes, with illustrated descriptions of the various places of interest on these routes and special articles. Other airline people might usefully try as hard as Scottish Airways to interest the prospective traveller who does not care so much about the means of travelling as the time taken and the features of the destination.

Nationalised Air France

SPECULATION as to who would succeed M. Tirard as the president of Air France in Paris have been partially settled by the appointment of General Bertrand Pujo, who recently retired from the position of *chef d'etat-major* in the French Air Force, to be chairman of directors and a vice-president of the company. He will fulfil the duties of president pending the appointment of a new holder of that office.

It is regarded as not impossible that General Pujo himself may be confirmed in the presidency. Air France is now a public corporation in which 25 per cent. of the shares are held by the State and the balance by private individuals. General Pujo is the State nominée. M. Tirard's retirement was brought about by the decree of June 6 last, which rendered it impossible for the holders of directorships in various commercial undertakings to be directors also of State-owned or partly State-owned concerns.

More B.O.A.C. Discussion

ONLY two points of any real importance were mentioned during the debate in the House of Lords after the Marquess of Zetland, the Secretary of State for India, had moved the second reading of the Bill.

Lord Strabolgi asked who was to manage the Corporation. He understood that Sir John Reith was to continue as managing director for a time, but that there was a likelihood that he would eventually become Governor of the Bank of England. Lord Cadman, who was, of course, the chairman of the civil aviation committee usually described by the use of his name, said that the need for a vigorous civil aviation policy had been amply recognised and suggested that certain Service types might temporarily be used for long-distance mail-carrying work. The cost would possibly be comparatively great, but the experience should be extremely valuable. He remarked that at least one foreign nation used machines for their overseas services which were, in actual fact, bombers, and that these machines were flown by crews which would duly man bombers in case of war.

In his reply the Marquess of Zetland added that though there was provision for 15 directors the Air Ministry proposed that a much smaller board should be appointed. He also inferred that Heston, when extensions had been completed, would replace Croydon as London's principal international airport.

Weather Soundings

FOR some time now various countries have been making use of a type of meterological balloon which is normally known as a radio sonde. This is a free balloon carrying the necessary instruments and a small transmitting set which, by variations in modulation, signals the values of the instrument recordings.

The radio sonde used by the American Navy Department was originally developed by the National Bureau of Standards and the production version of the recording unit is about as compact and light as such a unit can be. The equipment is carried in a light cardboard case covered with metallic foil and divided into two compartments. One of these houses the transmitter, the plugged-in battery and the pressure-switch unit, while the other compartment supports the radiation shield. This consists of two thin concentric aluminium tubes, the inner one carrying a mounting plate for the temperature- and humidity-sensitive resistance element.

The transmitter is a one-valve affair which represents a considerable advance on the prototype both in simplicity and performance. The transmitted waves are modulated at an audio rate which depends on the changing values of the temperature or humidity resistor. Tests, in relation to other means of measuring the temperature and humidity at different heights, have proved that the latest type of radio sonde can be absolutely relied upon.

Reciprocity in Africa

NOW that D.E.T.A. Airlines in Portuguese East Africa have their Junkers Ju.52s, they are going ahead with plans to extend their coastal and inland services to cross Africa to the Portuguese colony on the west coast. The idea is to operate a service from Lourenco Marques, via Elizabethville, to Loanda, in Angola. Apparently Belgium will authorise this service only on condition that S.A.B.E.N.A has the right to maintain the service jointly with them and, at the same time, to cross Angola on their projected Cape Town service.

South Africa has, it appears, already granted S.A.B.E.N.A. the necessary permission to run through to Cape Town, and in her turn has received the right to maintain a circular service taking in Johannesburg, Lobito, Leopoldville, Albertville and Kisumu. This service presupposes permission from the Portuguese for the South African Airways machines to land at Lobito, and there is no reason to suppose that there will be any difficulty over the conditions laid down by S.A.B.E.N.A. before permission is given to the Portuguese.

Exclusively Experimental

THE U.S. Civil Aeronautics Authority have recently "taken delivery" of their new experimental station and airport at Indianapolis. The site is just west of the municipal airport and the field has two 4,000-ft. runways. At the moment the equipment consists of a completely developed instrument-landing system, an ultra-high-frequency radio beacon, and a special system of bad-weather runway lighting. Two machines are at present assigned to the station, one a tricycle Waco for ultra-high-frequency radio work, and the other, a more conventional Stinson Reliant, for radio approach experiments. The particular approach system in this case is a refinement of the basic system developed by the U.S. Bureau of Standards many years ago.

One day, perhaps, our own Air Registration Board may have its own aerodrome for test and experimental work. Certainly, such work can be carried on very much more satisfactorily at a private base of this description.

Lorenz at Manchester

THE long-awaited equipment for the blind-approach installation at Manchester's Ringway airport has now arrived, and should be installed and ready before the end of the month. The particular interest in the Ringway equipment is that it will be possible for pilots to use it in conjunction with the contact-lighting strip at an aerodrome which is not only large but also has clear bad-weather approaches. The fog-line run at Ringway is actually 1,400 yds. in length, whereas until the extensions are completed that at Heston—the only other aerodrome with blind-approach as well as contact-lighting equipment—is very much less.

Incidentally, it is not generally known that the land at Ringway belongs partly to Manchester and partly to the Cheshire County Council. Both these authorities are concerned in making better road approaches; at present the comparatively poor roads in the vicinity form the weak link in the transport chain. The City Council plans to extend one of the main arterials to a point two miles nearer Ringway.

Two New Trans-Atlantic Types

SOME time ago we mentioned that the Blohm and Voss concern at Hamburg was proceeding with the development of a very large machine for transatlantic work. Some more information has now been released about this type, which is the B.V.222. It will have six engines and an all-up weight of some 45 tons. The ultimate range will be about 7,000 *km.* (4,400 miles) when carrying a certain number of passengers as well as rather more mail than is at present being carried by the Ha.139B. on the Atlantic services. It is expected that its cruising speed will be 275 *km/h.* (170 m.p.h.) on long-distance runs such as that of 5,150 *km.* (3,200 miles) between New York and Lisbon.

At the same time Dorniers are developing a very large flying boat on somewhat original lines. This will be designated the Do.20 and will be powered by eight Jumo diesels. These will drive four airscrews through special transmission and will, presumably, be duly buried, as they should be, in the wing. Twenty or thirty passengers, in addition to mail, will be carried over the Atlantic. The all-up weight will be somewhat similar to that of the Blohm and Voss.

BETTER BAD VISIBILITY

A New Device for Increasing the Range of Visual Observation in Fog

SOME two years ago—actually in the issue of October 15, 1936—we described the principle behind the Sinteræ beacon. The operation of this beacon was based on the proved fact that the retina of the eye is sensitive to the maximum degree only for a certain limited period of time, and that if a point of light or other object can be oscillated, it can be seen when otherwise it would not be picked up.

Although a certain amount of evidence was available to show that increased visual range should be obtained by using such a beacon, the increase was not sufficient or certain enough to justify the cost of beacon installation either at ports or airports. Mr. L. G. Toplis, who was responsible for its development, therefore decided to discard the idea of oscillating the source of light, and concentrated on modifying the effect of this source of light on, to use a scientific word, the observer.

The same principle, somewhat modified, continued to apply. It was contended that fog tended to render an object invisible because of the relative absence of contrast. Though some object or light might, in theory, just be seen, it might not be sufficiently obvious unless attention was directed to it. Again, the appreciation of slight variations in relative brightness can be accentuated if the contrasting object is given a slight reciprocating or oscillating motion in a plane at right angles to the line of vision.

It is obviously impracticable to subject all possible objects to such oscillation and, therefore, Mr. Toplis developed the "Reciproscope" which artificially provides the oscillation, by means of a movable mirror for the observer. This mirror is placed at an angle of 45 deg. relative to his line of sight, and the sighting direction is then made normal by fitting up an additional mirror to act as a form of periscope. The first mirror is reciprocated so that the image is deflected through an angle of about 3 deg., though both the angle and the rate of movement can be adjusted to suit the conditions.

In the accompanying diagram the relative movements have been exaggerated in order to explain the action, with "F" as the fog background represented as a plain surface, "O" as the objective, "M" and "M1" as the mirrors, and "E" as the retina of the eye, shown both in section and elevation. With the mirror "M1" stationary at the position "Y," that portion of "O" falling within the broken lines would stimulate an area on the retina represented by 1, 2, 3 and 4. By moving "M1" between the limits "X" and "Z" the impression of "O" is moved over the retina between 5, 6, 7 and 8. It should be remembered that the movement of "M1" does not give any apparent movement to "F," so that the movement of "O" is relative to "F." Furthermore, in normal vision, the stimulation created by "O" is constant over the area 1, 2, 3 and 4, whereas, with "M1" in motion, the stimulation changes over the area 5, 6, 7 and 8.

When using the Reciproscope it is essential that the surrounding field should give an impression of stillness in order that movement may be appreciated. To provide this effect, the instrument is fitted with an opaque screen which is between the observer and the mirror. This screen has an aperture of such a size that when standing at a convenient distance from it only the surface of the mirror is visible and all the surrounding objects are cut off from view. Needless to say, the Reciproscope only produces useful results in fog conditions,

The small size of the Reciproscope in its marine form is obvious in this photograph.

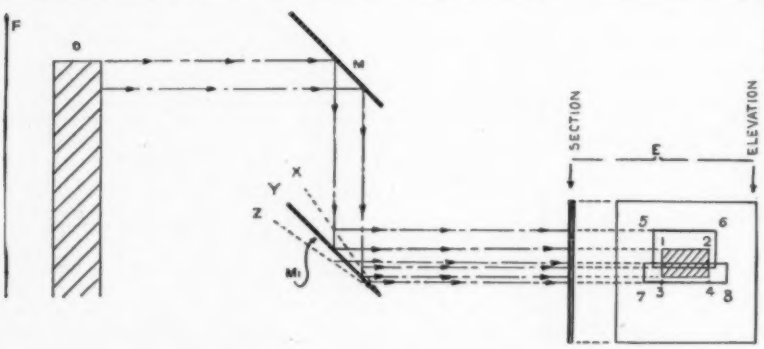
since it is necessary for a particular object to oscillate against an otherwise motionless field of vision.

The instrument does not provide the observer with a "picture" which he would not otherwise see in conditions of bad visibility—it merely indicates the presence of some object which could not be seen in normal circumstances. The instrument therefore gives warning in the form of a signal rather than of an actual pre-view.

Actually, the Reciproscope has proved itself to be extremely useful for marine purposes, since it undoubtedly provides, in fog, evidence of obstructions which are 25 to 50 per cent. beyond the range of normal vision. Whether or not this comparatively slight improvement in reception will be of any great value to aircraft crews can only be shown by a test. In cases where the visibility is reduced to, say, 200 yd., the crew of a machine approaching an object at 120 m.p.h. would only be given their warning (at the minimum 25 per cent. figure) one second earlier. But when visibility is at the more normal maximum of 1,000 yd. the pilot would be given an extra period of 4.25 secs., at the same flying speed, in which to prepare to avoid the obstacle. With a small and manœuvrable aeroplane the advantage would not be particularly useful, but five or six seconds might be just enough to give the pilot of a transport aeroplane time to open up, change pitch if necessary, start to raise his flaps, and generally get ready to climb.

In its mercantile form the Reciproscope is a small hand-held device which is no more cumbrous than a pair of field-glasses and a good deal lighter. If it was redesigned for use in aircraft it would obviously need to be made to form part of the normal dashboard equipment. The pilot would use it as an additional safety device, and would glance at it just as he normally does at his other instruments.

The Reciproscope has been developed by Sinterae, Ltd., of 36, Victoria Street, London, S.W.1, and the marine version is being made by Henry Hughes and Sons.



Illustrating the principle behind the Reciproscope, with "O" as the objective and "E" the retina of the eye. A detailed explanation is given in the accompanying article.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

Air Exercises

AT the time of going to press air exercises had been arranged to take place between 8 p.m. on Tuesday, August 8, and 7 p.m. on Friday, 11th. The arrangements were that the exercises should be on a larger scale than ever before, more than 1,300 aircraft taking part. The defence forces of Westland were to consist of about 800 machines, of which nearly 500 are fighters, about 50 general reconnaissance machines, and the rest friendly bombers. Four anti-aircraft divisions, ten London balloon squadrons, and fifteen groups of the Observer Corps were also to take part. Air Chief Marshal Sir Hugh Dowding is the commander of the defenders.

The attacking forces of Eastland were to be about 500 bombers under Air Chief Marshal Sir Edgar Ludlow-Hewitt. All these were to be of modern type, such as Wellingtons, Hampdens, Whitleys, Blenheims, and Battles.

The area of operations is south and east of a line through Withernsea, Macclesfield, Droitwich, Hungerford, Salisbury, Bournemouth. Eastland is a power situated somewhere in the North Sea.

The general arrangements are on the same lines as in former years. That is to say, the operations would be largely unreal, as attacking bombers were to be routed through areas where they would give practice to the ground units of the defence. No casualties would be assessed, and consequently all raids would get through, whether they had been intercepted by fighters or engaged by A.A guns. The object of the exercises is practice of all the components of the defence and attack, not an actual test of the effectiveness of either. In fact, neither side will win the war.

No operations must be carried out below 4,000ft. within seven miles of London Bridge. Aircraft on both sides might be flying without lights in the area except when over the sea eight miles from land, between 3,000 and 4,000ft. above the defended area, below 4,000ft. in the areas being used by civil aircraft, or when there was risk of a collision.

Fighters must flash their recognition lights up and down for a minute to show that they had made an interception, and bombers must reply with a similar signal.

The guns, searchlights, and Observer Corps were to be on duty continuously, the searchlight crews using their sound locators by daytime as well as by night. The gunners were instructed to aim and go through all the motions of engaging the raiders short of actual firing.

Flying Accidents

THE Air Ministry regrets to announce the following flying accidents:—

A.P/O. William Leonard Wright and A/Sgt. Leslie George Tarrant lost their lives and F/O. Percy Don Walker was slightly injured as the result of a collision in the air between two Royal Air Force aircraft which occurred in Lincolnshire on July 25.

Harold J. Reynolds died in the Royal Infirmary, Greenock, on July 27 as the result of injuries received in an accident to a Royal Air Force aircraft, which occurred near Greenock on July 26. Mr. Reynolds was a passenger in the aircraft. Sgt. George William Robson, the pilot, L.A/C. Sydney John Ball and A/C.1 William Edward Ward, the other members of the crew, were slightly injured.

F/O. Eric Wilson Yates, A.P/O. Douglas Henry Kitson Alwood and Cpl. Reginald Cameron Morrell, lost their lives as the result of a collision in the air between two Royal Air Force aircraft which occurred at Lossiemouth on August 1.

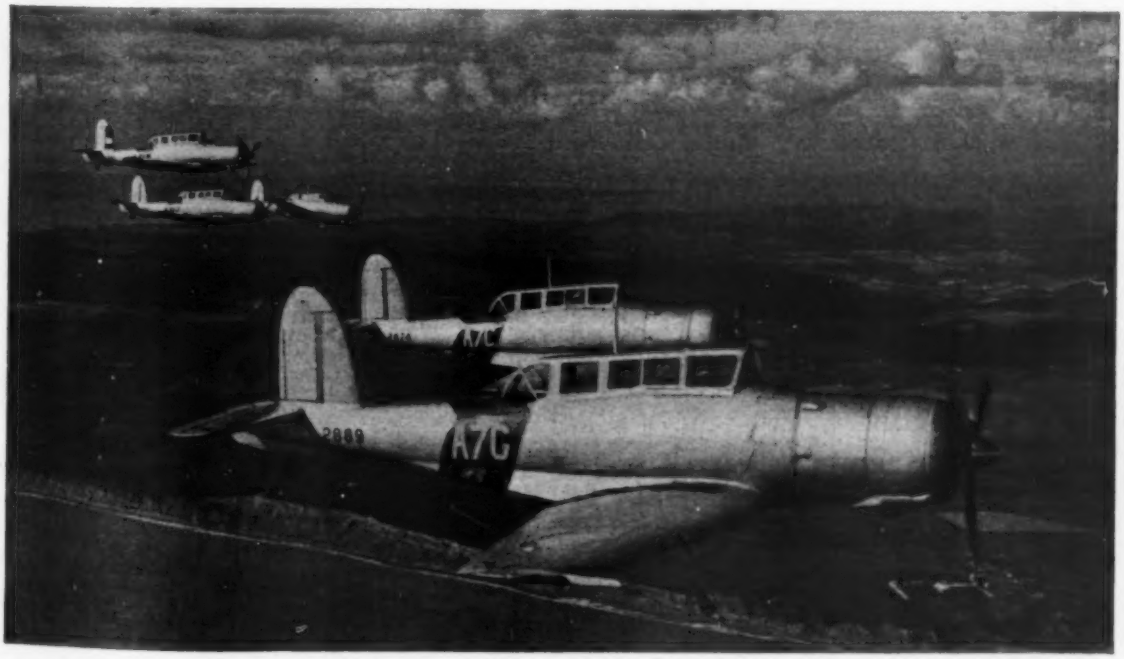
Royal Air Force Gazette

Royal Air Force

Air Ministry, August 1

General Duties Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (August 1):—B. H. Becker (seniority June 1); B. A. Chacksfield (seniority June 1); E. G. Thompson; H. B. Hurley; R. A. C. Barclay; H. Stanton; C. C. House; G. C. Tomlinson; G. R. Howie; R. G. R. Buckley; R. A. E. Traill; J. S. McLean; G. J. Grindell; G. J. Spence; E. B. King; J. W. Young; I. J. McGhie; G. E. Peacock; W. B. Fleming; D. C. Oliver; G. N. Amison; R. A. I. Harrison; W. A. Hughes; G. H. Gatheral; A. H. Jarand; G. A. V. Knyvett; P. H. R. Saunders, R. M. Bradley; L. B. B. King; G. Thripp; J. N. Knowles; D. E. B. Wheeler; J. Thompson; C. H. Brandon; G. A. Mills; H. M. T. Eversfield;



COASTAL PATROL : Two flights of Blackburn Skua fleet fighter dive-bombers (Bristol Perseus XIII sleeve-valve engine) make an attractive picture off the South Coast. A detailed descriptive article on the Skua appears in this issue of *Flight*.

SERVICE AVIATION (CONTINUED)

E. H. P. Clarke; J. C. Bevan; G. W. Peel; F. Rump; J. Shepherd-Smith; D. P. Hanafin; A. V. Sawyer; P. J. A. Riddell; D. M. H. Craven; J. B. P. Thomas; D. N. J. P. Leggett; W. M. Graham; B. J. Paul; R. G. Prier; N. D. Gilbart-Smith; S. T. Misselbrook; R. J. Burrough; C. Charlton-Jones; A. F. Hards; P. C. Hilton; J. R. A. Embling; A. Foord-Kelcey; H. M. W. Thomas-Ferrand; G. A. M. Pryde; T. B. Morton; L. C. Bicknell; D. F. Dixon; D. H. S. Rusher; J. A. K. Pettit; A. R. D. MacDonnell; A. W. B. Barrett; G. T. Toland; H. D. Fraser; D. H. Lee; T. R. Vickers.

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—April 19 (seniority January 19).—P. J. Canney (Acting Flight Lieutenant). July 19.—H. R. Larkin (Acting Flight Lieutenant).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—June 12.—A. P. Williams, R. A. Field. June 16.—S. P. Woollatt, C. A. Baskett. June 21.—D. F. J. Willis, June 23.—H. A. H. Watts. July 12.—P. C. Lemon, C. R. C. Howlett, J. P. C. Rolt, R. Thompson, H. W. Poultney. July 21.—D. A. Peacock, H. G. Graham-Hogg, B. W. Hayward, C. E. Bowen, L. F. M. Saunders, J. H. Newberry, N. F. Morris, V. Rees. July 27.—J. R. Birch.

Group Capt. J. W. Cordingley, C.B.E., is granted the acting rank of Air Commodore (paid) on appointment as Director of Manning, Air Ministry (July 17).

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—April 17.—D. I. McLeod. May 12.—J. S. Adams. May 18.—G. S. ff. Powell-Shedden. July 3.—J. St. J. Thomson. July 17.—G. H. N. Gibson.

F/O. N. M. McElligott is granted the acting rank of Flight Lieutenant (unpaid) (July 18).

The following Pilot Officers are granted the acting rank of Flight Lieutenant on the dates stated:—B. Romanoff (since promoted) (April 11); D. H. Mackay (May 11); R. F. Aitken (June 1); J. F. Dilworth (June 12); R. A. Towgood (June 29); V. G. Bamber, H. W. Barnard (July 1).

The following Flying Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—G. L. B. Hull (June 19); A. R. H. Beauman (July 14); A. N. Jones (July 23).

Group Capt. I. T. Lloyd, C.B.E., is placed on the retired list at his own request (July 31); Sqn. Ldr. A. H. Marsack, M.B.E., is placed on the retired list on account of ill-health (August 1); Sqn. Ldr. H. L. Rough, D.F.C., is placed on the retired list at his own request (August 1); Flt. Lt. G. R. Canavan is placed on the retired list on account of ill-health (July 30); F/O. M. W. Donaldson is transferred to the Reserve, Class C (July 14); P/O. D. C. Ross relinquishes his short-service commission on account of ill-health (August 1); Acting P/O. on probation J. H. Kimber relinquishes his short-service commission on account of ill-health (July 29); the short-service commission of Acting Pilot Officer on probation O. W. Steele is terminated on cessation of duty (July 25).

Equipment Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (August 1):—W. T. Lewis; B. G. Pool; F. C. Read; J. E. Reynolds; R. G. Seymour; A. J. Howell; W. J. B. Elliott; H. H. Hilliar; G. C. Allen; H. E. Freeston; J. W. C. Revill; G. Blinman; H. A. Sudbury; E. N. Lowe; W. A. Lee; B. S. Cartmel; L. H. Anness, A.F.C.; A. Wall; E. R. Berry; E. E. Copper; C. H. Baker, M.B.E.; W. Eccles; P. S. Stewart; S. W. Thomas; G. J. E. Parsons; F. B. C. Fundrey; R. E. P. Paynter, D.C.M.; C. W. Goodchild, M.B.E.; R. J. Williams; G. Thornton, M.M.

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated (April 14):—L. A. Jackson; E. G. Metcalf; F. G. Carle; E. G. Farthing; R. V. B. Franklyn. June 7.—A. J. Goatly.

The short service commission of Acting Pilot Officer on probation R. G. Lambie is terminated on cessation of duty (June 22).

Accountant Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (August 1):—A. W. Younghusband, K. E. M. Holmes, W. F. Quilliam, J. Lambie, R. S. Sweet.

The following Flying Officers are granted the acting rank of Flight Lieutenant (June 11):—L. T. Starling, H. W. Secar.

Dental Branch

Flt. Lt. L. C. Bellsham-Revell is transferred to the Reserve, Class D (August 1).

Commissioned Engineer Officer

W/O. L. T. Wright is granted a commission as Flying Officer on probation with effect from July 12 and with seniority of June 12.

Commissioned Signals Officers

The following Flying Officers on probation are confirmed in their appointments on the dates stated:—H. P. Johnston (June 30); R. W. King (July 2).

Commissioned Armament Officers

The following Warrant Officers are granted commissions as Flying Officers on probation with effect from July 12 and with seniority of June 19:—F. E. Pearce, J. E. W. LeGras.

Commissioned Photography Officer

W/O. L. Mant is granted a commission as Flying Officer on probation (July 24).

Erratum

In the *Gazette* of July 4, for W. G. Lawrence read W. G. Lawrance.

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

P. W. A. Dudgeon is granted a commission as Flying Officer in Class A with effect from July 24 and with seniority of February 3, 1933; J. S. J. Craigen is granted a commission as Flying Officer in Class C with effect from July 24 and with seniority of July 24, 1925.

The following are granted commissions in Class CC in the ranks and on the dates station:—*Squadron Leader.*—A. W. Shaw (May 30). *Flight Lieutenants.*—Telegraphist-Lt. W. Small (R.N. Ret.) (May 10); Flight Lt. F. Whilton, D.C.M. (R.A.F. Ret.) (May 17); Sec. Lt. C. J. Lewin (May 27); Lt. K. L. Warrington (May 27th); Capt. the Hon. G. R. B. Bingham (R.A.R.O.) (May 30); Capt. M. S. Shuldham-Legh (R.A.R.O.) (June 1); Maj. R. W. Tobin (S.U.L.I.A.) (June 12). *Flying Officers.*—Lt. R. E. Butler (May 15); Sec. Lt. C. E. Buck (June 19).

The following Flight Lieutenants are granted the rank of Squadron Leader on the dates stated:—A. H. Dalton (March 27); F. V. Gauntlett (June 6).

Flight Lieutenant R. W. G. West (Flight Lt., R.A.F. Ret.) is granted the rank of Squadron Leader in Class CC (June 12); Flying Officer N. McLeod is granted the rank of Flight Lieutenant (June 12).

The following Flying Officers (Acting Flight Lieutenants) are granted the acting rank of Squadron Leader in Class CC on the dates stated:—May 30.—T. R. Wheatley (R.A.F.O.). June 14.—W. R. A. Matheson (R.A.F.O.).

Flt. Lt. W. T. Walton is transferred from Class A to Class C (July 14); Flt. Lt. C. K. Turner Hughes resigns his commission and is permitted to retain his rank (March 30); Flt. Lt. H. S. R. Burt relinquishes his commission on completion of service and is permitted to retain his rank (July 12); Flt. Lt. P. R. W. Carthew relinquishes his commission on completion of service (July 16); P/O. C. Bland relinquishes his commission on completion of service and is permitted to retain his rank (July 18).

Equipment Branch

The following are granted commissions in Class CC as Flight Lieutenants on the dates stated:—May 25.—Capt. G. Knott (R.M. Ret.). June 19.—Lt. W. J. Allingham (I.A. (Ret.).

Flt. Lt. W. H. Anderson relinquishes his commission on cessation of duty (July 7).

Miscellaneous

Lt.-Col. J. E. Hume, D.S.O. (R.A.R.O.), is appointed Assistant Provost Marshal, and is granted a commission in Class CC in the rank of Flight Lieutenant (Honorary Squadron Leader) (July 3).

Royal Air Force Volunteer Reserve

General Duties Branch

The following are granted commissions as Pilot Officers on the dates stated:—July 18.—Lord D. Douglas-Hamilton. August 1.—A. G. A. Fisher, W. D. H. Kessler.

W. Man., D.F.C., is appointed Honorary Flight Lieutenant with effect from February 6, and is granted the honorary rank of Wing Commander with effect from June 20.

The following are appointed honorary Flight Lieutenants on the dates stated:—June 1.—Lt.-Col. W. R. A. Scott (R.I.A.S.C. Ret.). June 12.—Lt.-Col. C. O. R. Mosse, M.C. (I.A. Ret.). June 15.—Lt.-Col. E. C. Secondé (I.A. Ret.). June 16.—Sec. Lt. C. G. Cowing.

F/O. J. B. Seager relinquishes his commission on completion of service (July 9).

Administrative and Special Duties Branch

The following are granted commissions as Pilot Officers on probation:—L. Abraham, J. Blackwood, R. Buchanan, M. O. F. England, the Rt. Hon. Lord Gisborough, A. S. Hett, E. Y. Hughes, R. G. Netting, R. W. K. Skinner, A. W. Slater, W. B. Walker, D.F.C., E. B. Williams.

The following Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer on the dates stated:—April 2.—L. A. Kann, R. F. Palmer, E. B. Pinder-Davis. April 5.—E. B. Baring, E. R. H. Pollak. April 19.—J. E. L. Skelton. April 23.—S. Leigh. April 28.—F. Adams. April 30.—P. T. Carden, G. Freshville. May 7.—F. S. Isaac. May 16.—P. Y. H. Smith.

Pilot Officer on probation (Honorary Flight Lieutenant) G. D. Pegler resigns his commission (July 2).

Equipment Branch

A.P/O. A. D. Hadler ceases to be employed with the Royal Air Force (June 30).

Medical Branch

The following are granted commissions in the ranks stated (August 1):—*Flight Lieutenant.*—A. Nelson-Jones, M.D., M.R.C.P. *Flying Officers.*—T. M. Banham, M.B., B.Ch., M.R.C.S., L.R.C.P.; L. S. Calvert, M.R.C.S, L.R.C.P.; J. M. Kerr, M.B., Ch.B., D.P.H.; B. G. B. Lucas, M.R.C.S., L.R.C.P., D.A.; W. M. Ritchie, M.B., Ch.B.

Dental Branch

The following are granted commissions as Flying Officers (August 1):—H. Layfield, L.D.S., R.F.P.S.; C. J. Woodcock, L.D.S.

SERVICE AVIATION (CONTINUED)

Auxiliary Air Force

Flt. Lt. A. W. Shaw relinquishes his commission on cessation of duty (May 30).

No. 500 (COUNTY OF KENT) SQUADRON.—C. D. Pain is granted a commission as Acting Pilot Officer (April 23).

No. 604 (COUNTY OF MIDDLESEX) SQUADRON.—F/O. J. A. Davies is promoted to the rank of Flight Lieutenant (April 25).

No. 605 (COUNTY OF WARWICK) SQUADRON.—A. H. C. Boughton-Leigh is granted a commission as Acting Pilot Officer (May 21); F/O. D. R. Scott is promoted to the rank of Flight Lieutenant (April 25); P/O. H. G. Doody is promoted to the rank of Flying Officer (May 27).

No. 609 (WEST RIDING) SQUADRON.—F/O. P. Drummond-Hay is transferred to the Reserve, Class A (April 1).

No. 613 (CITY OF MANCHESTER) SQUADRON.—G. F. H. Webb is granted a commission as Pilot Officer (August 1).

No. 614 (COUNTY OF GLAMORGAN) SQUADRON.—P/O. R. E. C. Cadman is promoted to the rank of Flying Officer (April 15).

No. 1 BALLOON CENTRE.—R. J. Farrant is granted a commission as Flying Officer (July 4).

No. 901 (COUNTY OF LONDON) SQUADRON.—F/O. W. V. Dumbreck is promoted to the rank of Flight Lieutenant (March 17).

No. 902 (COUNTY OF LONDON) SQUADRON.—F/O. C. D. Kershaw is promoted to the rank of Flight Lieutenant (May 11); A.P/O. V. S. Butler is promoted to the rank of Flying Officer (May 11).

No. 903 (COUNTY OF LONDON) SQUADRON.—F/O. J. T. Phelan is promoted to the rank of Flight Lieutenant (June 26).

No. 905 (COUNTY OF SURREY) SQUADRON.—The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—April 26.—E. G. Bunce-Phillips. June 26.—Sir J. C. P. Milbanke.

No. 906 (COUNTY OF MIDDLESEX) SQUADRON.—F/O. H. F. Tiarks is promoted to the rank of Flight Lieutenant (July 7).

No. 907 (COUNTY OF MIDDLESEX) SQUADRON.—F/O. R. H. Berryman is promoted to the rank of Flight Lieutenant (July 10).

No. 908 (COUNTY OF ESSEX) SQUADRON.—D. C. Shuter is granted a commission as Pilot Officer (July 11).

No. 909 (COUNTY OF ESSEX) SQUADRON.—F/O. J. T. Wordsworth is promoted to the rank of Flight Lieutenant (May 22).

No. 916 (COUNTY OF WARWICK) SQUADRON.—Capt. J. L. Padmore, M.C., is granted a commission as Flight Lieutenant (July 17).

No. 918 (COUNTY OF DERBY) SQUADRON.—The following are granted commissions in the ranks and on the dates stated:—

Pilot Officer (April 4).—R. W. Toft.

Acting Pilot Officer (June 30).—E. H. Darwood.

No. 919 (WEST LANCASHIRE) SQUADRON.—C. H. Ratcliffe, M.M., is granted a commission as Acting Pilot Officer (July 13).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—May 15.—F. G. Gaskin; May 19.—W. M. S. Fox

The following Pilot Officers are transferred to No. 921 (West Lancashire) Squadron on the dates stated:—May 16.—C. L. Lomas; May 17.—W. G. Redmond.

A.P/O. L. B. Ridley is transferred to No. 920 (West Lancashire) Squadron (May 18).

No. 920 (WEST LANCASHIRE) SQUADRON.—A.P/O. L. B. Ridley is promoted to the rank of Flying Officer (May 18); A.P/O. H. A. V. Gibb is transferred to No. 921 (West Lancashire) Squadron (May 12).

No. 921 (WEST LANCASHIRE) SQUADRON.—The following are granted commissions in the ranks and on the dates stated:—*Flight Lieutenant* (May 15).—Capt. J. R. Milne, D.F.C. *Acting Pilot Officer* (June 7).—T. A. F. Robinson.

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—May 16.—C. L. Lomas; May 17.—W. G. Redmond.

No. 922 (WEST LANCASHIRE) SQUADRON.—R. J. S. Martin is granted a commission as Acting Pilot Officer (July 7); P/O. F. C. Stubbs is promoted to the rank of Flying Officer (May 17).

No. 924 (EAST LANCASHIRE) SQUADRON.—F. L. Bradshaw is granted a commission as Pilot Officer (July 7); A.P/O. C. Arnold is promoted to the rank of Flight Lieutenant (May 20); A.P/O. R. C. Hawkins is confirmed in rank and graded as Pilot Officer (May 16).

No. 926 (EAST LANCASHIRE) SQUADRON.—E. H. Stewart is granted a commission as Acting Pilot Officer (May 21); A.P/O. R. E. Mason is promoted to the rank of Flight Lieutenant (May 18).

No. 934 (COUNTY OF DEVON) SQUADRON.—J. G. Kellock is granted a commission as Acting Pilot Officer (July 7).

No. 945 (CITY OF GLASGOW) SQUADRON.—The following are granted commissions as Pilot Officers:—July 10.—A. G. Brown, F. B. Hood, J. S. Steven.

No. 946 (CITY OF GLASGOW) SQUADRON.—J. M. Simpson is granted a commission as Flying Officer (July 10).

No. 947 (CITY OF GLASGOW) SQUADRON.—G. Coghill is granted a commission as Pilot Officer (July 20).

Equipment Branch

No. 906 (COUNTY OF MIDDLESEX) SQUADRON.—E. J. D. Ettwell is granted a commission as Flying Officer (July 17).

No. 907 (COUNTY OF MIDDLESEX) SQUADRON.—H. Clayton is granted a commission as Pilot Officer (July 20).

Accountant Branch

No. 906 (COUNTY OF MIDDLESEX) SQUADRON.—C. P. Bennett is granted a commission as Pilot Officer (May 31).

Medical Branch

No. 904 (COUNTY OF SURREY) SQUADRON.—L. Stone, L.R.C.P., L.R.C.S., is granted a commission as Flying Officer (June 12).

FOREIGN SERVICE NEWS

The New Boeing Proved

IN *Flight* last week there was an illustration of the Boeing B17B four-engined bomber which has been developed from the standard type of B17 as used by the U.S. Army Air Corps. It has lately been announced that one of these machines, taking advantage of the exhaust-driven superchargers fitted to its Wright Cyclone engines, has flown from Burbank, California, to New York (2,500 miles) in 9 hours 14 minutes. According to Major Umstead, who was in command, the machine reached a maximum height of 33,000ft. and never flew below 20,000ft. It is stated that a maximum speed of 376 m.p.h. was reached over Ohio.

Official details of the armament load have not been released but it is believed that the machine will carry four 2,000 lb. bombs.

A Standard Italian Bomber

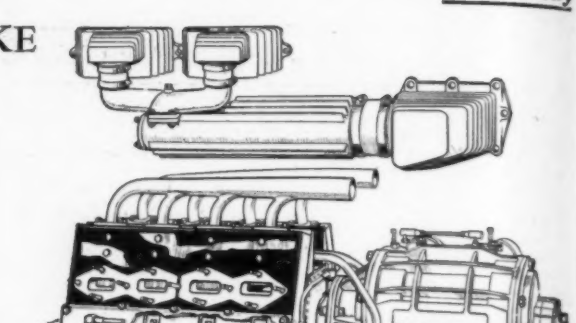
A NUMBER of squadrons of the Italian Air Force are equipped with the Caproni Ca.135 twin-engined monoplane bomber. This machine is the opposite number of our Hampden and carries up to 2,600 lb. of bombs. The defensive armament comprises three machine guns.

Two Piaggio P.XI R.C. 40 radials giving 1,000 h.p. each at 13,000ft. constitute the power plant. The top speed is given as 270 m.p.h. at 15,500ft. and the minimum speed as 72 m.p.h. The climb to 13,000ft. takes only 12 min. 53 sec., and it is said that the machine will climb from 5,500ft. to 10,500ft. in 40 min. with a single engine while carrying a load of 4,400 lb. At a speed of 205 m.p.h. the range with full bomb load is said to be 1,240 miles.

RUMBLING IN: A Lockheed Hudson reconnaissance bomber (two Wright Cyclones) coming in to land with Fowler flaps lowered. The machine illustrated, apparently, is not fitted with the standardised "letter-box" slots.

AN ADVANCED TWO-STROKE ENGINE DESIGN

New High-performance Supercharged Developed for Aircraft



In this drawing of the four cylinder Jameson two-stroke engine the cover plate has been partially cut away to expose the levers which actuate the sliding valves.

ALTHOUGH logically the two-stroke engine is a step towards the ideal internal combustion engine because the idle revolution so necessary in the four-cycle petrol engine is obviated, aircraft engineers have the world over regarded it with suspicion. Even in recent times there have been few attempts to apply the two-stroke principle to an engine suitable for aircraft, partly on the score that owing to certain inherent features this type of engine was either remarkably inefficient or far from being an economical proposition.

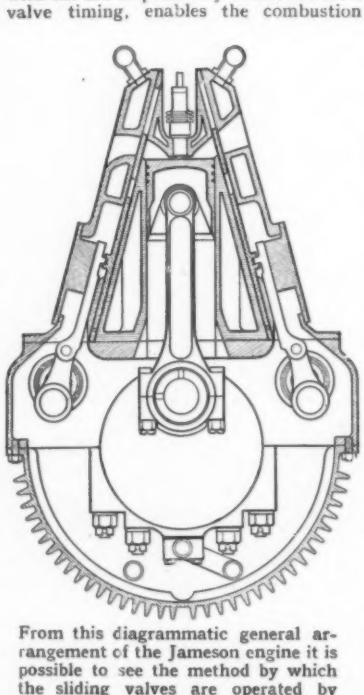
It is true that it has been possible to supercharge two-stroke engines and even control the flow of exhaust gases to a certain extent, but in the main the fuel consumption and power developed was rarely encouraging. Consequently it comes as a refreshing change to learn of at least one British designer who has persisted for over fifteen years in developing the two-stroke principle, with the result that there is in existence to-day a most interesting example of an engine of this type.

The designer is Mr. J. L. Jameson, of Jameson Aero Engines, Ltd., whose works at West Street, Ewell, Surrey, supply many firms in the aircraft industry with jigs, tools and finished components. Mr. Jameson has developed a liquid-cooled vertical four-in-line two-stroke having a capacity of 1½ litres and a bore and stroke of 72 mm. and 90 mm. This engine is the natural development of a number of engines previously built by him and which incorporated various types of valve-operated ports—Mr. Jameson is convinced that most of the trouble connected with two-stroke engines is caused by the want of independently operated valves and a high supercharger pressure.

Unusual Appearance

Externally the new engine has an unusual appearance by reason of the inclination of the water-jackets, which taper upwards and give the cylinder block a triangular form in end view. But perhaps the most interesting feature of the engine is the valve gear. On either side of the crankcase are situated two camshafts which are in effect crankshafts, because each incorporates four throws operating a similar number of miniature connecting rods. The small ends of these rods are located in the lower ends of the levers or links that actuate the valves. Each valve is of the sliding type with a small rectangular aperture situated approximately three-quarters of its length towards the top. The valve slides up and down a chamber, the surface of which is water-cooled for practically its entire length. The reciprocating motion of the valve enables its aperture to open and close the port. After each firing stroke the top of the valve slides into the cylinder head, where its surface comes into contact with the cylinder head water jacket while the ports are opened. Both inlet and exhaust valves are held against the wall of their operating chamber by the pressure within the cylinder when the ports are closed.

The contour of the cylinder head is unusual in that the combustion chamber is shaped to form an inverted deflector. The mixture is introduced at a normal operating pressure of 30 lb./sq. in. This pressure is obtained by the use of a Jameson positively located vane type supercharger running at crankshaft speed. This compressor, incidentally, produces a positive pressure from 300 r.p.m. upwards. The heavily finned induction pipe is divided internally into two sections which are connected to two manifolds of equal length. The mixture when introduced into the cylinder head follows normal two-stroke practice and, with the aid of positively controlled inlet valve timing, enables the combustion chamber to be completely scavenged without wastage. The exhaust valve begins to open at 50 degrees before bottom dead centre and closes when the piston is some way up the scavenging stroke. The inlet valve is timed to open just before the exhaust valve closes, but remains open for only a very short period to enable final compression.



From this diagrammatic general arrangement of the Jameson engine it is possible to see the method by which the sliding valves are operated by levers and small connecting rods secured to the crankshafts on either side of the main crankshaft.

Owing to the characteristics of the Jameson engine the crankshaft arrangement is somewhat unusual. The first two throws are at 180 degrees, while the last two, also at 180 degrees, are at 90 degrees to the first two throws. Consequently the firing cycle is in the order of numbers 1, 4, 2 and 3 cylinders, the complete cycle taking place in one revolution of the crankshaft.

Beneath the crankshaft at the forward end of the engine is located a train of gears which drive the timing gear, two magnetos, the oil pumps and the centrifugal water pump. Actually there are three oil pumps consisting of one scavenging, one high-pressure and one low-pressure type. The last-named supplies the lubricant to the valve gear. The main high-pressure pump feeds the hollow crankshaft through the five main bearings and thence to the big ends. By means of a drilled oil lead up the web of the connecting rod oil is fed from the big-end bearing to the needle roller small end, and from there it is directed on to the inside of the piston crown.

Variable Timing

Although this particular engine is being primarily developed for use in Lord Howe's E.R.A. racing car it should be still looked upon as being in the development stage and in consequence it is equipped with one or two unusual features such as variable timing obtained by advancing or retarding the intermediate timing pinion of each camshaft on an Archimedian screw thread. This device enables the timing to be advanced or retarded for experimental purposes while the engine is running.

At the moment it is not possible to disclose any performance figures, but it can be said that a previous engine produced 138 b.h.p. per litre on the brake at 4,500 r.p.m. It can be stated, however, that plans have been made to build an eight- or sixteen-cylinder horizontally opposed engine of the same type.

The Industry

Bristol Results

SPEAKING at the annual general meeting of the Bristol Aeroplane Co., Ltd., Mr. W. G. Verdon Smith (the chairman) said that the company's manufacturing resources had been employed to their maximum capacity upon an increasing scale. In the aircraft factory a steadily increasing output was built up, and deliveries were accomplished earlier than programme dates. The company's Blenheim aeroplane had been produced in large quantities, and had deservedly established a high reputation for its outstanding performance. The new type of fast bombing and general reconnaissance aircraft known as Beaufort had been developed and had already flown with conspicuous success. Production was already under way.

With regard to aero engines, large numbers of Pegasus and Mercury engines of the poppet-valve type had been produced, while production of engines of the sleeve-valve type had been steadily increasing in volume without reducing the total output.

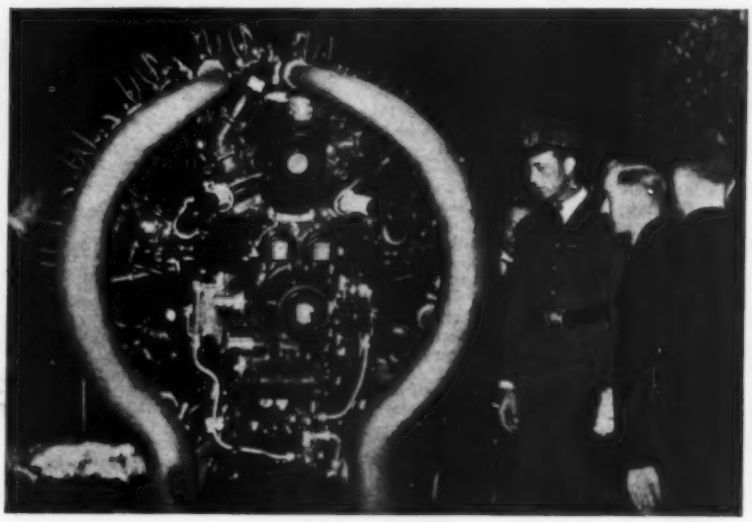
The expansion of the company's business during the year had been due in no small measure to considerable orders for the company's products from the Dominions, and from friendly foreign countries, and the company had been able to achieve delivery of such engines and aircraft without interfering with the requirements of our own Government. In addition agreements had been entered into for the construction abroad, under licence, of both engines and aircraft. It was satisfactory that following the recent visit of the British Mission to Australia a decision was reached that the Beaufort aircraft should be selected for manufacture in that Dominion.

Among the chairman's remarks regarding the financial position was the statement that the interim dividend of 7½ per cent. and the final of 7½ per cent. should not be regarded as 15 per cent. for the whole year, since the interim of 7½ per cent. was paid on the old Ordinary capital of £1,200,000, before it was increased to £3,300,000 towards the end of 1938. If the interim of 7½ per cent. on the old capital were related to the new capital on which a final of 7½ per cent. was to be paid, the total distribution proposed for the year would, in relation to the present capital, be equivalent to approximately 10 per cent.

Measuring by Light

LIGHT waves have been employed for hundreds of years as a medium for accurate measurement, but it is only in recent times that the principle has been adapted to the requirements of the modern tool-room. Many precision measuring instruments in the Van Keuren range of tools make use of the light wave principle for checking combination gauge blocks, production flatness tests, etc., to limits of millionths of an inch.

In the Van Keuren Company's latest catalogue full details are given of various types of light wave measuring equipment, with particulars of rectangular reference gauges, microgauges, taper insert and small plug gauges. In addition suggestions are made in connection with the use of measuring wires. The catalogue is obtainable, with an English price list, from George H. Alexander Machinery, Ltd., 82, Coleshill Street, Birmingham, 4.



H.M. THE KING OF THE BELGIANS pauses at the Alvis stand during the recent Brussels Show. The engine is the Pelides.

Government and Profits: Views at H.P. Meeting

SPEAKING at the annual general meeting of Handley Page, Ltd., held in London recently, Mr. S. R. Worley (the chairman) said that last year he had spoken of the completion of the Harrow contract and that they were then engaged on the construction of the Hampden. By the end of the year under review they had completed and delivered a certain number of those machines. They were still fully engaged on constructing machines of that type, and they had others in view. They were glad to say that the Hampden was giving great satisfaction in service.

Their turnover for 1938 had been slightly in excess of that for 1937, and stockholders might therefore inquire the reason for the drop in the net profits amounting to about £20,000. They had put back to profit £30,000 not now required for income-tax purposes, so that the comparable figures really showed a reduction of profits of about £50,000. There were several causes which had contributed to that result, but perhaps the main reason was the vigilance with which the authorities scrutinised costs and their apparent desire to decrease still further the profits made by constructors. Therefore, in relation to their turnover, their profits were not large.

In the interests of the country they considered that the Government should exercise every economy, but it was essential that efficiency in working should not be overlooked. They claimed that, machine for machine, they could not be beaten for efficiency consistent with good workmanship and economical methods of production. It seemed to him, as an accountant, that there was grave danger in the adoption of any method which in actual fact amounted to the equivalent of "time-and-line contracts plus a percentage for profits." When such contracts were placed, there was likely to be a stifling of effort for cheap production. In their factory their great aim was to study every method to reduce costs, consistent with good workmanship.

Mr. F. Handley Page (managing director) said that the year which had passed had been one of continued great activity in the company's operations. Their Hampden-type aircraft had not only been in production at the works, but was also being manufactured at other works in this country and by a group of companies in Canada. Their technical progress was illustrated by the fact that the Hampden, although smaller in size, could carry a greater bomb load than the Harrow heavy bomber, which it replaced, and with long-range tanks could fly over 3,000 miles.

Power Boats for Belgium

THE Administration de la Marine, on behalf of the Belgian Air Ministry, have ordered from the British Power Boat Co., Ltd., two 37ft. 6in. aircraft tenders of a make and pattern similar to those used by the Royal Air Force.

The boats will be fitted with British radio apparatus and searchlight gear adapted for their particular requirements by the designers and builders of the craft, and they will be fully bonded and screened for radio reception and transmission. Mounting for machine guns will be carried on the wheelhouse roofs.

After trials in Southampton Water the craft will be required to proceed to Belgium by sea under their own power. Delivery is expected in eight weeks.

Showing Which Way

THOSE strange but valuable appendages usually erected at the most obscure corners of aerodromes and variously known as wind-indicators, wind-socks, wind-sleeves, and (in early Service days) by even more descriptive names, are the subject of a news item from C. C. Wakefield and Co., Ltd., who favour the title of "wind-cones" and state that they can supply them free of charge to aerodrome owners or clubs.

The indicators are of standard pattern —14ft. long—and are complete with metal bracing and ropes. Requests should be addressed to the Aviation Department, Wakefield House, Cheapside, London, E.C.2.

The Industry

Britain's Oilfields

FOR some time past the Anglo-American Oil Company has been carrying out exploration work in Scotland in search of oil. At Dalkeith three wells have been sunk, two of which have been producing oil at a steady rate. Satisfied with its operations across the Border, the Company has been conducting a survey for oil prospects farther south. It has been granted four new licences to search in Lancashire in the area bounded by Blackpool, Bolton, Blackburn and the Mersey, including the shallow sea area in Liverpool Bay. At the same time, considerable structure-drilling has been going on in North-East Yorkshire to determine the nature of the strata.

To assist in the reconnaisance the Company is using an interesting geophysical instrument known as a gravimeter. This instrument is one of the most sensitive in the world and indicates the structural qualities of the earth far beneath the surface by measuring the "pull" of gravity over the areas concerned.

New London Map

MANY members of the industry are faced with frequent business journeys by car in the London area—an increasingly intimidating business in these days of new suburbs that spring up in a night and of that particularly inadequate variety of signposting which always seems to be reserved for large and complicated cities. All such travellers should find real use in a new road map produced by the Geographers' Map Co., Ltd., Napier House, 24-27, High Holborn, London, W.C.1, under the title of *Thirty-five Miles Round London*. This "half-inch" map, which includes a detailed index to places, is published at 2s. on paper, 4s. on cloth or 6s. on cloth dissected, and is obtainable from leading booksellers.

MORE COMPANIES

ACCORDING to Jordan and Sons, the Chancery Lane company registration agents, 51 new companies concerned with aviation were registered during the first six months of this year. Their capital totalled £151,600. Fifty were registered as "private" companies, and only one as a public company.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

JANSON PRECISION TOOLS, LTD.—Capital £5,000. To make precision press tools for aeronautical and motor car production. Directors: M. Fairest, D. Fairest. Registered office: 46-62, Sorby Street, Sheffield 4.

O. R. ACKWORTH & Co., LTD.—Capital £100. Insurance of all classes including aircraft risks. Directors: O. R. Ackworth, J. M. Ackworth. Registered office: 2/3, Royal Exchange, London, E.C.3.

SLINGSBY SAILPLANES, LTD.—Capital £10,000. To manufacture gliders sailplanes and other aircraft. Directors to be appointed. Solicitors: W. E. Clayton-Smith and Son, Pontefract.

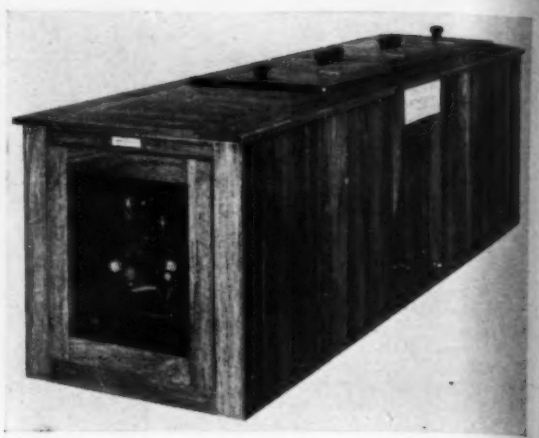
FIREPROOF TANKS, LTD.—Capital £6,000. To acquire from Compagnie Industrielle Materiel Aeronautique the benefit of knowledge relating to the manufacture of rubber and other substances and their application to fuel tanks, for aircraft, etc. Subscribers: G. W. Richardson and A. H. Tiltman (directors of Airspeed (1934), Ltd.). Directors: Jean Bellezanne and M. H. Dugue. Solicitors: Cameron, Kemm and Co., 24, Old Broad Street, London, E.C.2.

INCREASES IN CAPITAL

BRITISH AMERICAN AIR SERVICES, LTD. (Heston Airport, Hounslow).—Nominal capital increased by £7,900, beyond registered capital of £100.

PARNALL AIRCRAFT, LTD. (Yate Aerodrome, Bristol).—Nominal capital increased by £3,000, beyond registered capital of £450,000

RIVETS OFF THE ICE: This compact cabinet for keeping duralumin rivets at a temperature of minus 17 deg. C, and thereby extending the necessary normalising period from the usual two hours to 150 hours, has been specially designed for Parnall Aircraft, Ltd., by Gardiner, Sons and Co., Ltd., of Queen's Road, Bristol, 8.



In Brief

Percival Aircraft, Ltd., give notice that they are vacating their London office at 20, Grosvenor Place, S.W.1, and all communications should be sent in future to them at Luton Airport, Beds.

* * *

Every conceivable form of A.R.P. requirement, from first-aid station dressing-gowns to pick-axes, and from Wellington boots to high-explosive demonstration bombs, is covered in a new A.R.P. catalogue issued by Mosers, Ltd., 170-192, Borough High Street, London, S.E.1.

* * *

On the face of it, those unromantic but indispensable items known as refractories—in other words, firebricks for furnaces and other specialised purposes—would not seem to provide very picturesque material for a catalogue, yet a most attractive descriptive brochure, illustrating these items in their natural colours, and including details of "Pyruma" and other fire cements, has been issued by J. H. Sankey and Sons, Ltd., Ilford, Essex.

Some applications of Callender cables to aircraft are illustrated in the current issue of *Concerning Callenders*, the Company's periodical. Some attractive photographs show Short Sunderlands and Empire flying boats, in which these cables are used extensively. There is well over a mile of Callender cable in a Sunderland.

* * *

Short Brothers, Ltd., have produced a most attractive souvenir booklet, on art paper, commemorating the visit of their Majesties the King and Queen to the Rochester Works on March 14.

* * *

Needless to say, one of the most vital aspects of A.R.P. shelter maintenance is the provision of efficient emergency lighting, both to reassure personnel and to facilitate dealing with casualties. Nife Batteries, Ltd., of Redditch, Worcestershire, have produced a very comprehensive catalogue of emergency lighting equipment, both with and without engine-driven generators. One noteworthy point is the reminder that "Nife Batteries need no trickle charging or peace-time maintenance."

AERONAUTICAL PATENT SPECIFICATIONS

(Published July 27, 1939).

32652. HAUTIER, C.: Variable-pitch screw propellers (508,366).

32816. TILTMAN, A. H. and AIRSPEED (1934), LTD.: Aeroplanes (508,367).

35751. BRISTOL AEROPLANE CO., LTD., and PONTING, R.: Hydraulic control valve arrangements (508,303).

35911. BENDIX AVIATION CORPORATION: Pressure regulating valves (508,313).

36253. GENERAL AIRCRAFT, LTD., WILLIAMS, D. L. H., and CROCOMBE, F. F.: Landing gear for aircraft (508,211).

36259. BARBAROU, M. J.-B.: Mounting and driving of co-axial twin propellers for aircraft (508,501).

14. FERRANTI, LTD., CLUDERAY, E. S., and THOMAS, I.: Gyroscopic rate of turning indicators (508,213).

15. FERRANTI, LTD., CLUDERAY, E. S., and THOMAS, I.: Inclinometers (508,214).

360. COBHAM, SIR A. J., ALLISON, P. R., TRIPP, E. J., and FLIGHT REFUELLING, LTD.: Means for establishing a cable or like connection between aircraft in flight (508,220).

1851. ASH, JUN., T.: Aerodynamic rotors (508,225).

3105. BAITA, P.: Means for preventing the deposition of moisture and formation of ice on the windscreens of automobiles, aircraft and the like (308,395).

3445. AUTOMOTIVE PRODUCTS CO., LTD., PARKER, S. M., and THORNHILL, P. W.: Jack systems for aircraft (508,231).

3520. ROE & CO. LTD., A. V., and BRASLEY, C. R. A.: Gun sights for aircraft (508,397).

7231. QUILTER, J. R. C.: Fastenings for parachute harness (508,243).

18726. RICHARDS, A. C., and AERO PISTON RING CO., LTD.: Piston rings (508,429).

18840. TELEFUNKEN GES. FUR DRAHTLOSE TELEGRAPHIE: Radio direction finders (508,139).

21359. WESTCOTT, F. W., and TAIT, J. A.: Airscrews (508,146).

22937. DAIMLER BENZ AKT.-GES.: Fuel-injection in internal-combustion engines (508,527).

24000. HEINKEL, E.: Methods and systems of coating, more particularly for aircraft engines (508,150).

25698. ELEKTRON CO.: Undercarriages for aircraft (508,158).

26048. JUNKERS FLUGZEUG-UND-MOTORENWERKE AKT-GES.: Apparatus for producing bores of uniform polygonal cross section (508,443).

27098. MERCIER, P. E.: Airscrew systems (508,446).

29708. DÖRNIER-WERKE GES., and DORNIER, C.: Aircraft hollow structural members (508,348).

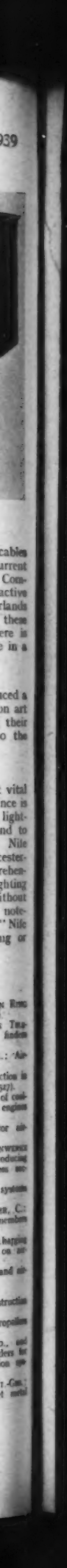
34910. FEIGL, B.: Apparatus for discharging fluids from containers arranged on aircraft (508,282).

5227. HEINE, H.: Non-metallic airscrews and airscrew blades (508,298).

(Published August 3, 1939.)

569. HAW, J. H.: Airscrew blade construction (508,967).

23502. LAMPTON, G. T.: Airplane screw propellers (508,916).

7788. AUTOMOTIVE PRODUCTS CO., LTD., and GAIES, G. R. G.: Master cylinders for liquid pressure power transmission systems (508,889).

5893. HENSCHEL FLUGZEUG-WERKE AKT.-GES.: Drawing Press for shaping sheet metal (508,775).